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(12) **United States Patent**
Li

(10) **Patent No.: US 11,661,752 B2**
(45) **Date of Patent: May 30, 2023**

(54) **CERAMIC TILE LEVELING BRACKET, PUSHING AND CLAMPING PLIERS, AND CERAMIC TILE LEVELING AND LAYING SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/028,820**

(22) Filed: **Sep. 22, 2020**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 16/470,512, filed as application No. PCT/CN2017/096189 on Aug. 7, 2017, now Pat. No. 10,988,944.

(30) **Foreign Application Priority Data**

Dec. 18, 2016 (CN) 201621388937.1

(51) **Int. Cl.**
E04F 21/18 (2006.01)
B25B 27/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***E04F 21/1877*** (2013.01); ***B25B 7/02*** (2013.01); ***B25B 27/02*** (2013.01); ***E04F 21/0092*** (2013.01); ***E04F 21/22*** (2013.01)

(58) **Field of Classification Search**
CPC E04F 21/1877; E04F 13/0892; E04F 21/0092; E04F 21/22; B25B 27/02; B25B 7/02
See application file for complete search history.

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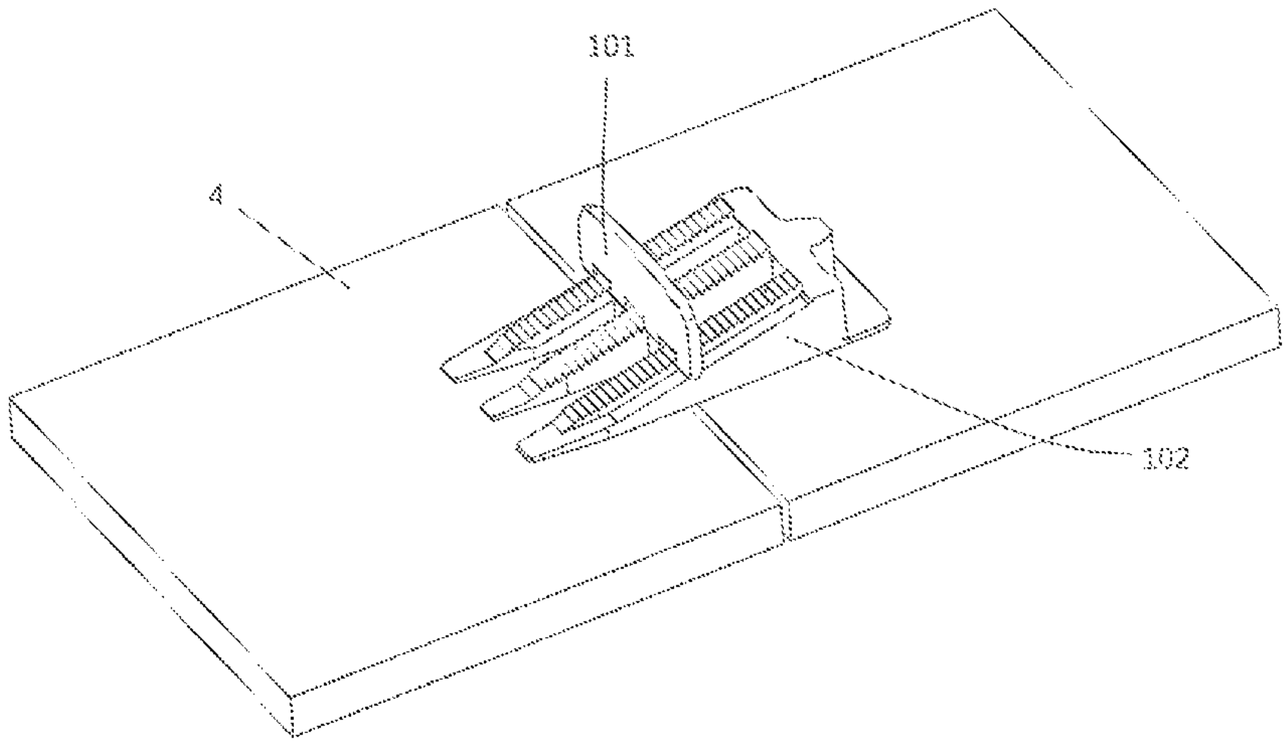
Primary Examiner — Andrew J Triggs
(74) *Attorney, Agent, or Firm* — Cochran Freund & Young LLC; William W. Cochran

(57) **ABSTRACT**

Disclosed are a ceramic tile leveling bracket, pushing and clamping pliers, and a ceramic tile leveling and laying system. The ceramic tile leveling and laying system comprises: a ceramic tile leveling bracket, an insertion block, and pushing and clamping pliers, wherein the ceramic tile leveling bracket is disposed at a junction of at least two adjacent ceramic tiles, one end of the insertion block is inserted into an insertion block receiving portion of the ceramic tile leveling bracket, and the pushing and clamping pliers push and clamp the insertion block into a ceramic tile leveling bracket such that a bottom face of the insertion block is tangent to upper surfaces of the ceramic tiles. The ceramic tile leveling and laying system is easy to operate, and improves the laying efficiency and laying quality.

10 Claims, 24 Drawing Sheets



(51) **Int. Cl.**

E04F 21/22	(2006.01)
E04F 21/00	(2006.01)
B25B 7/02	(2006.01)

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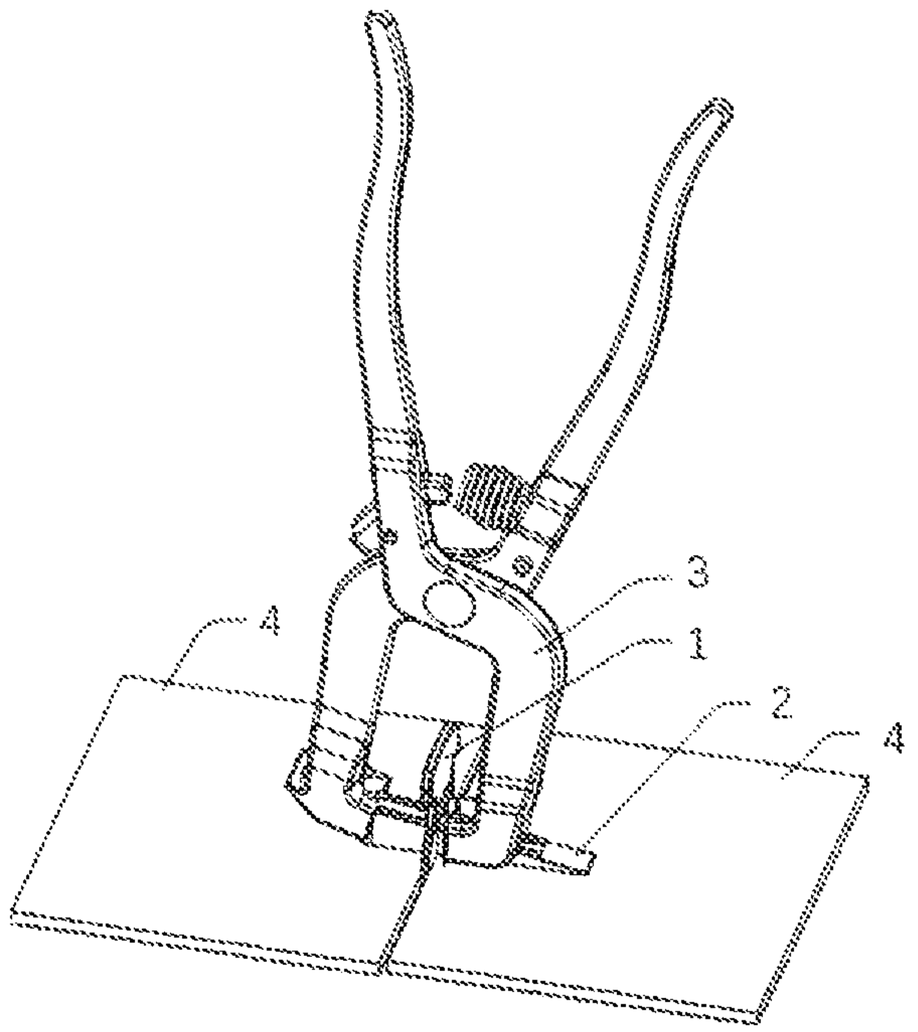

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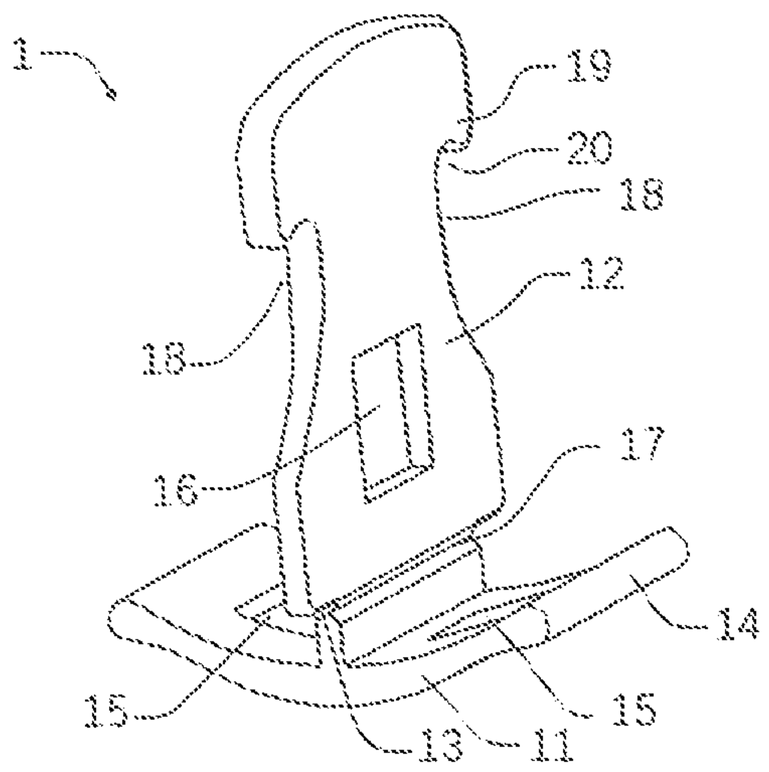

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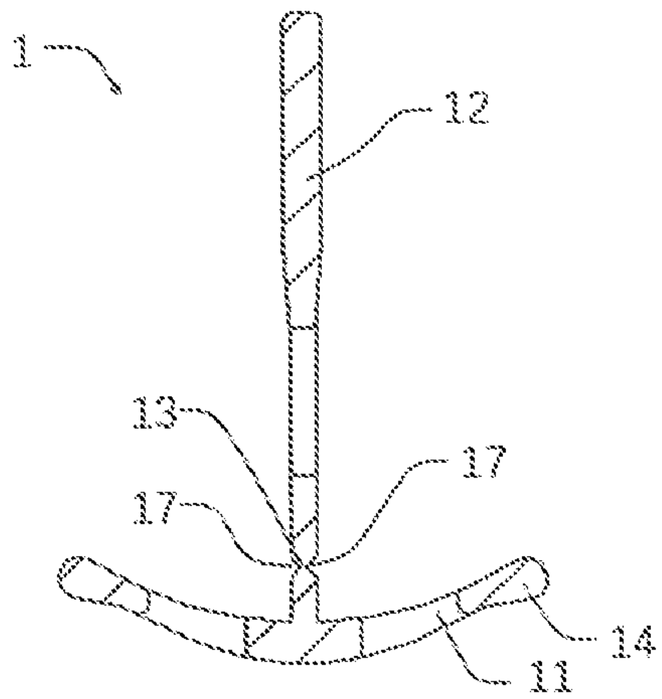

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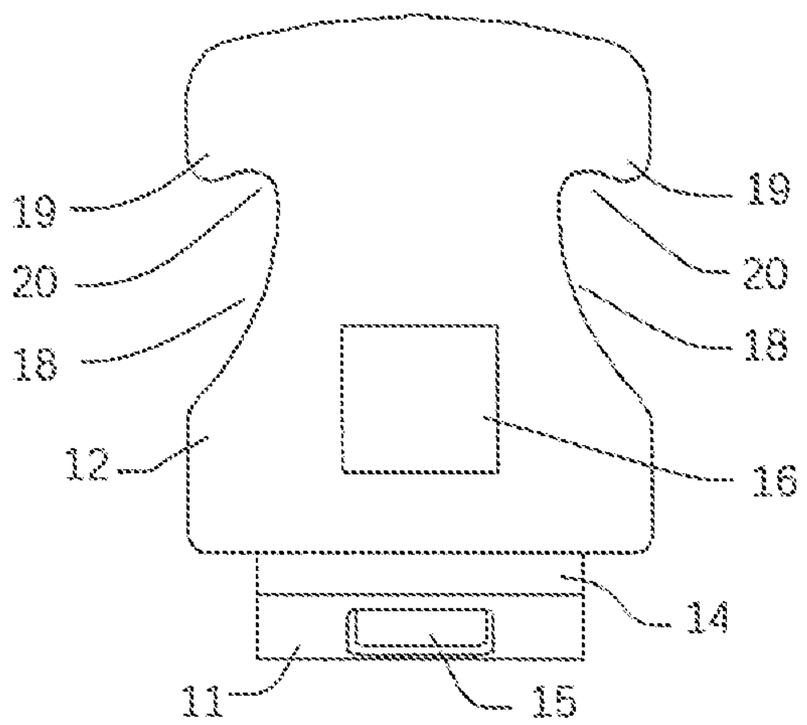

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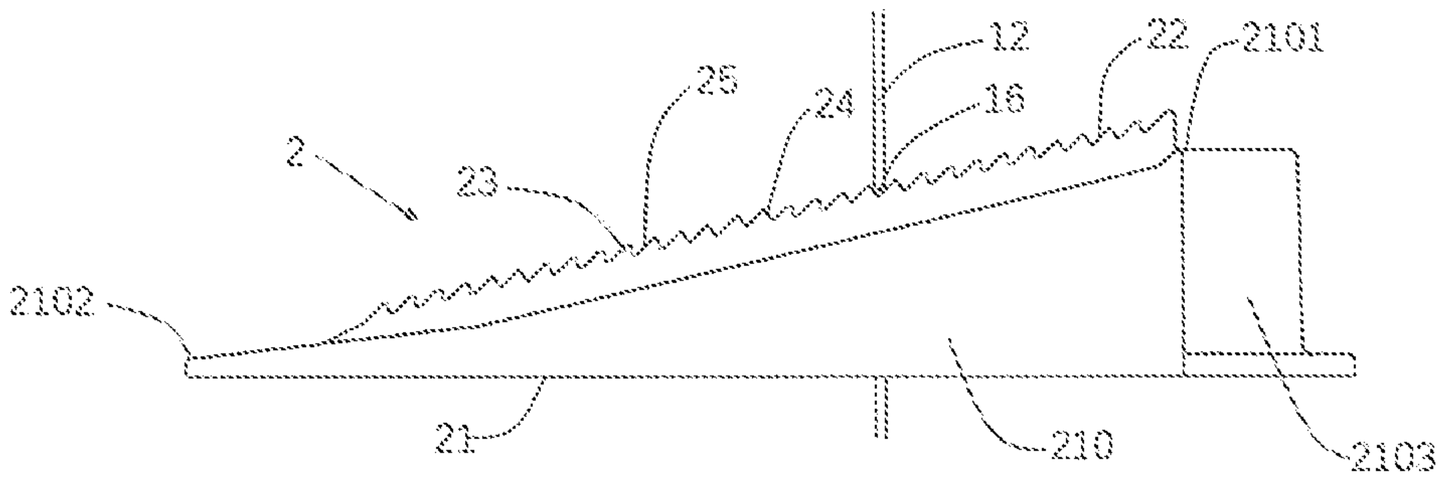

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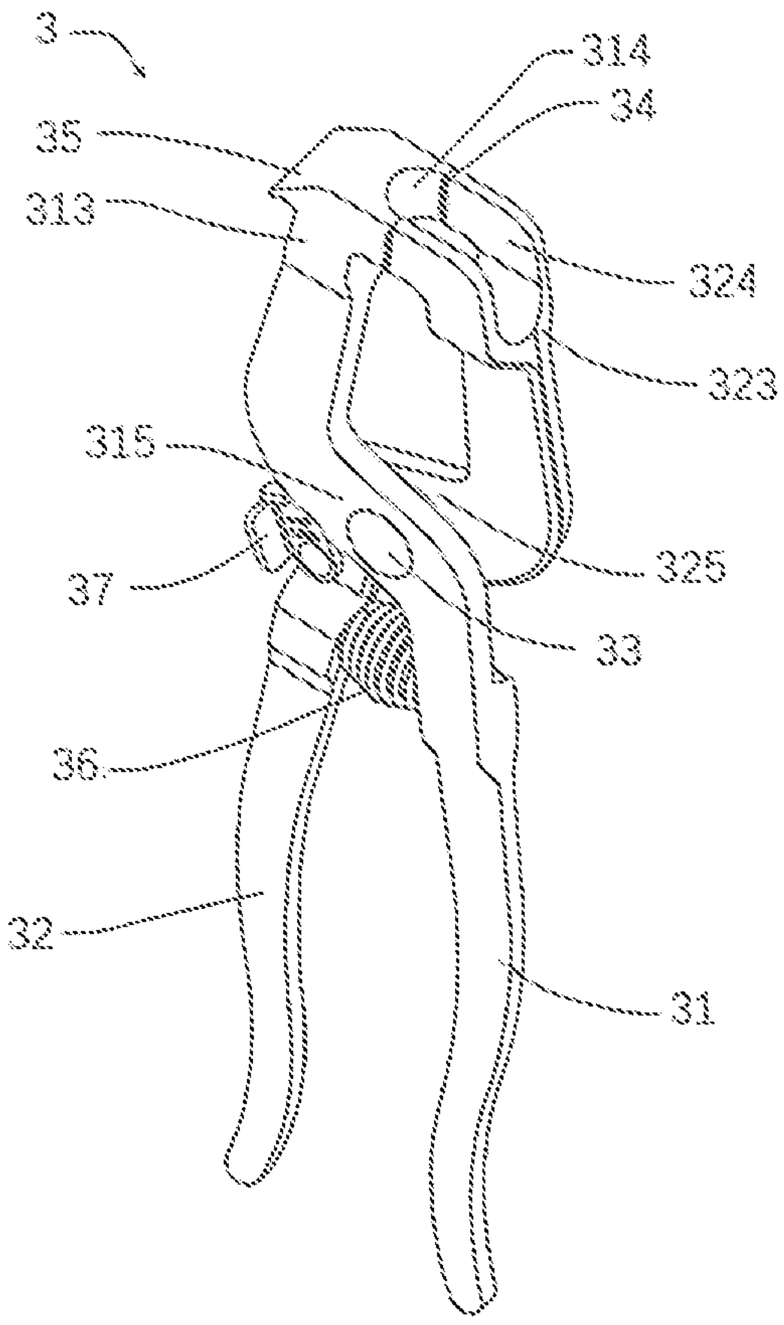
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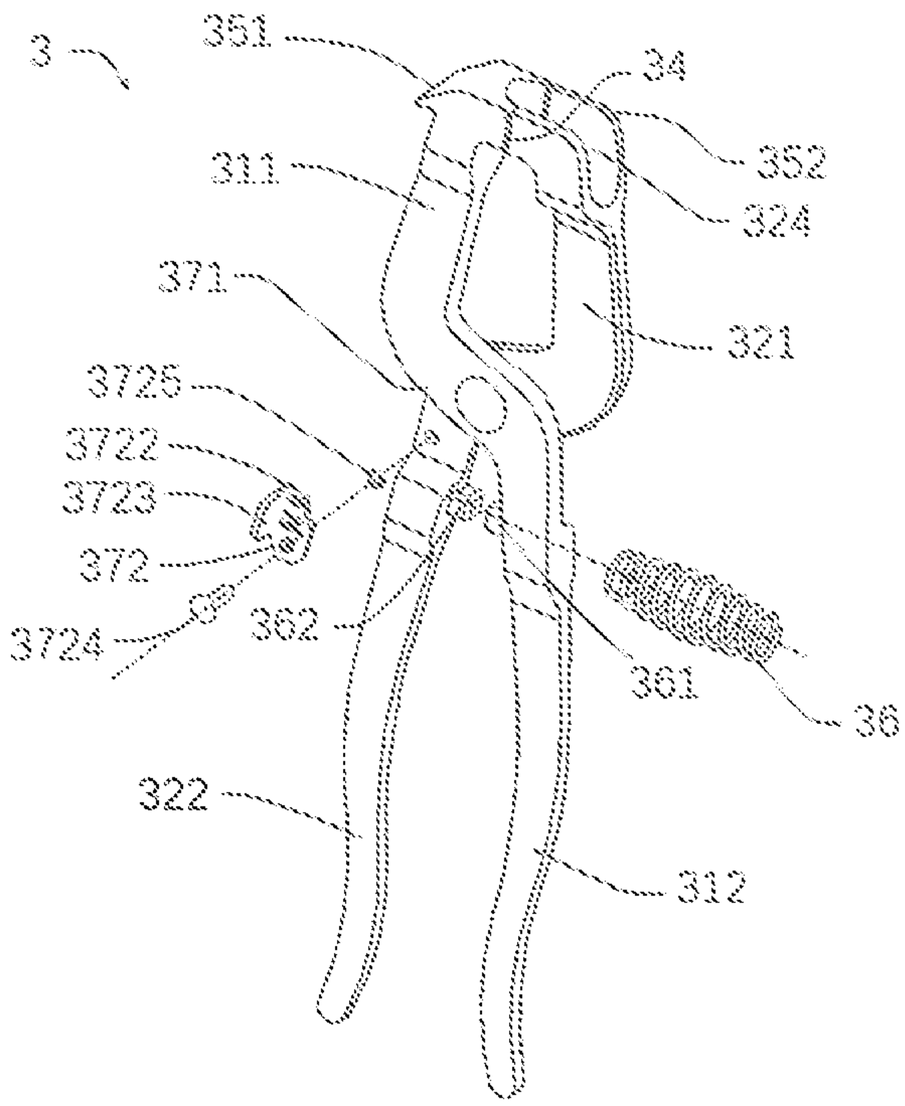
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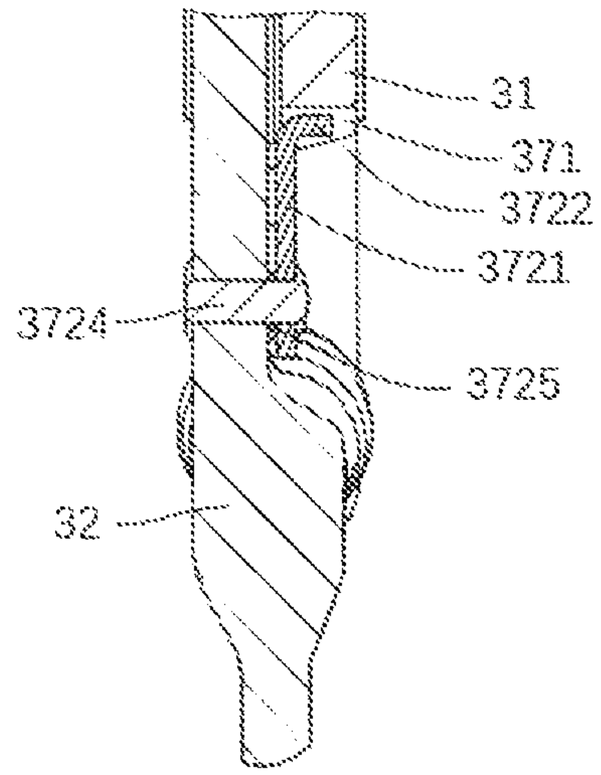

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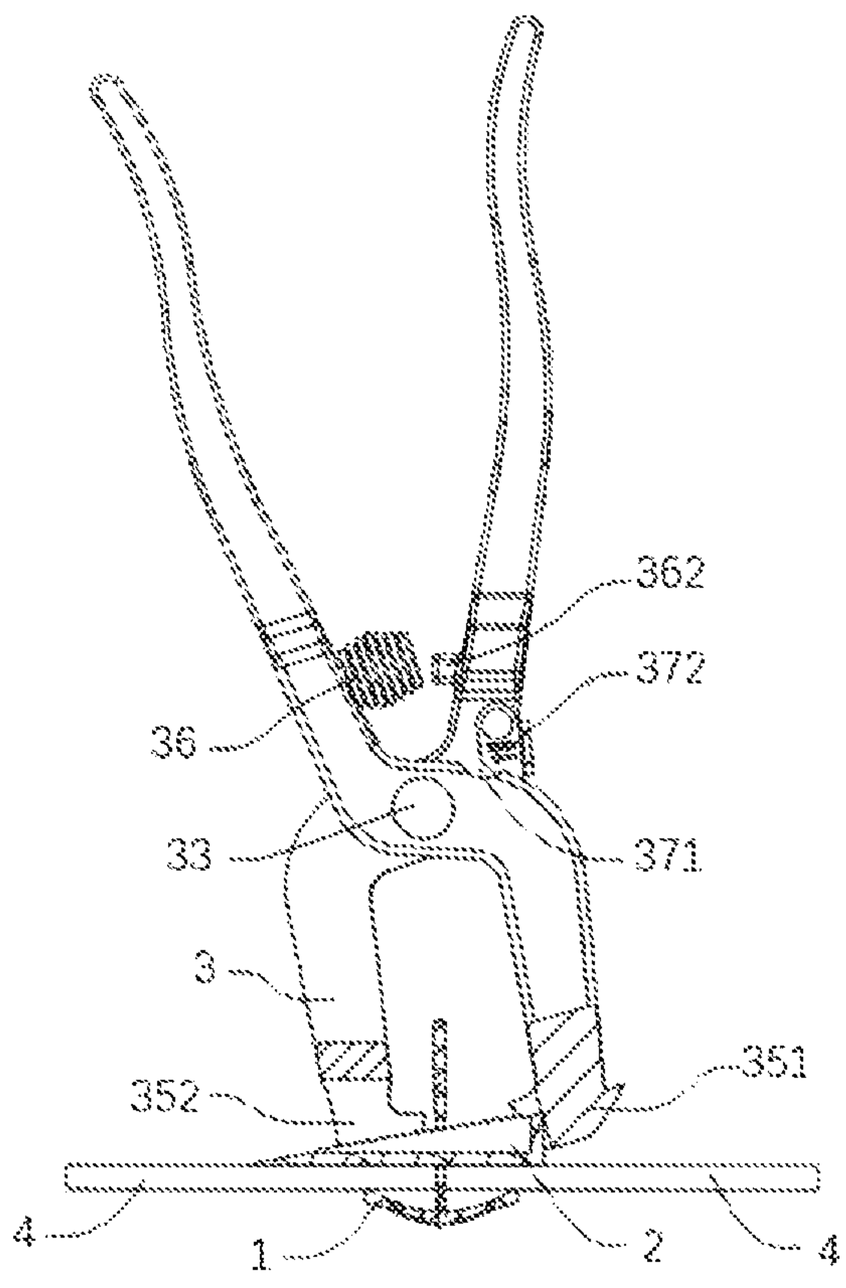

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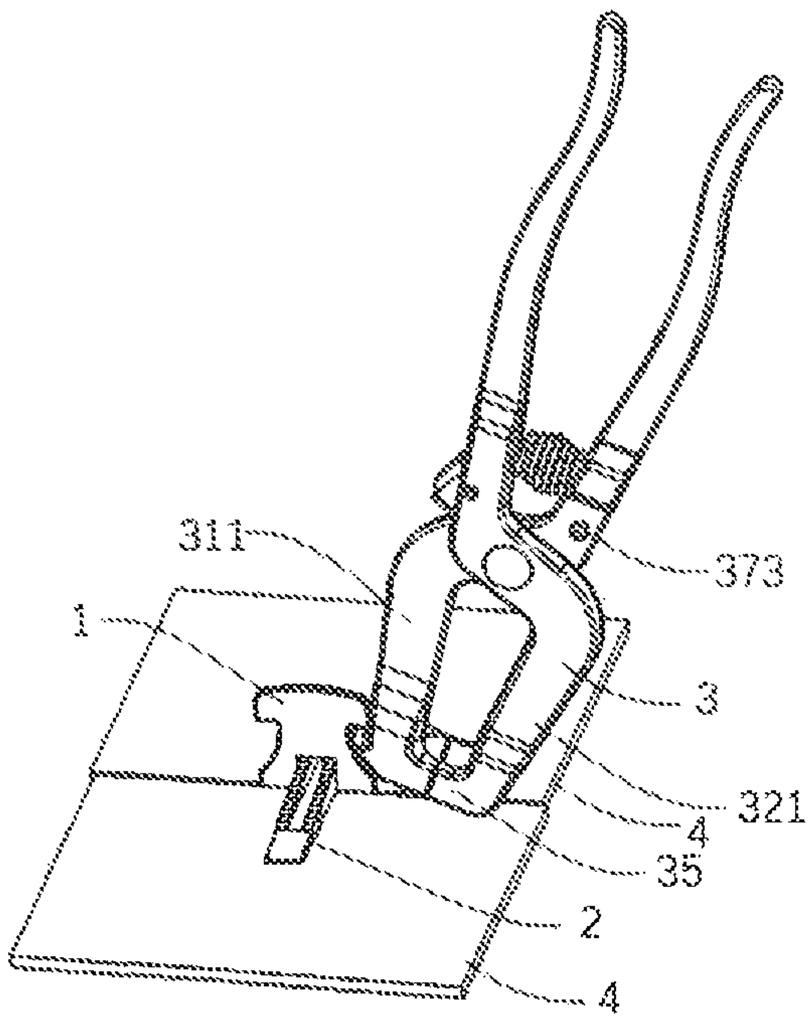

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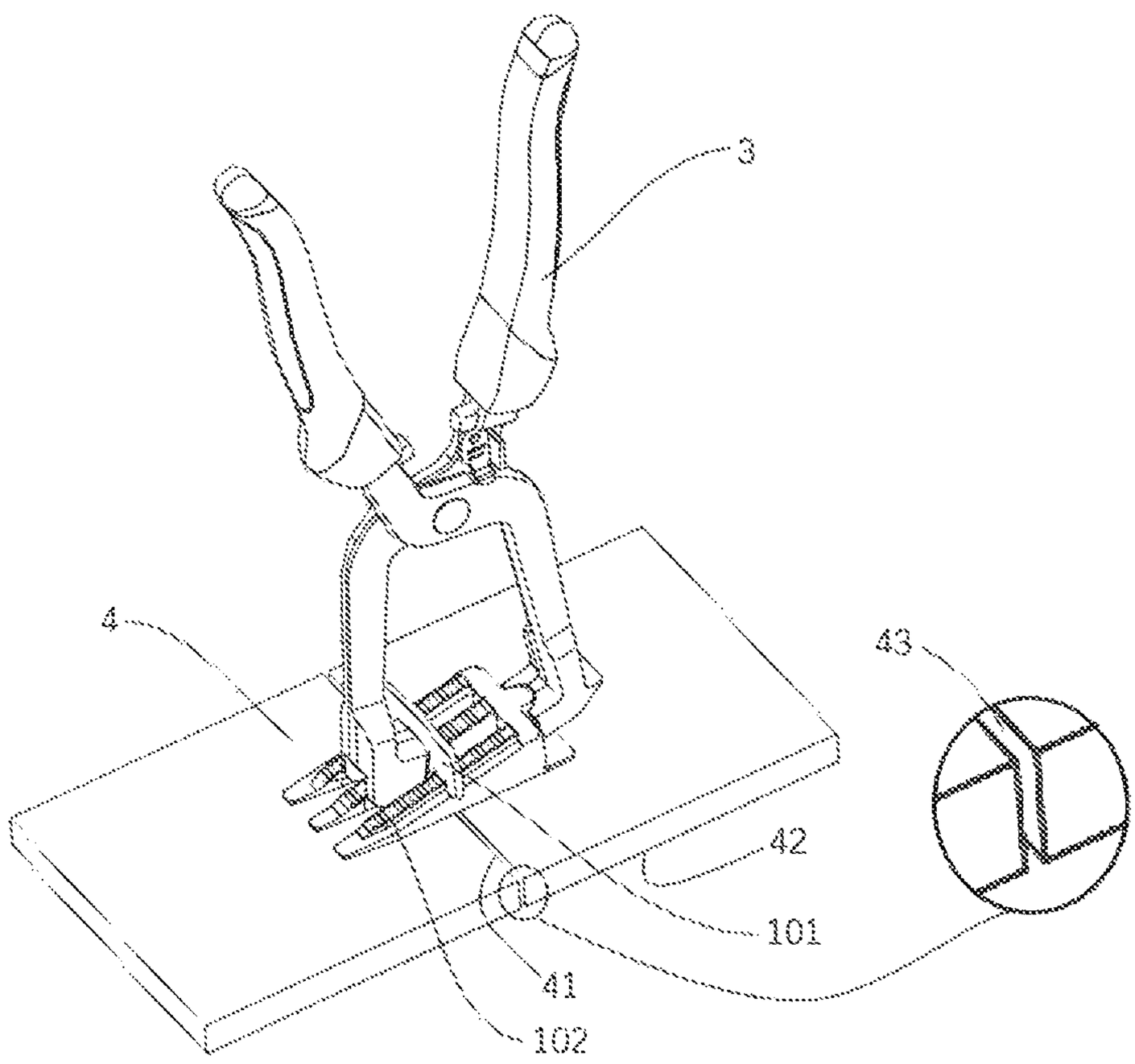

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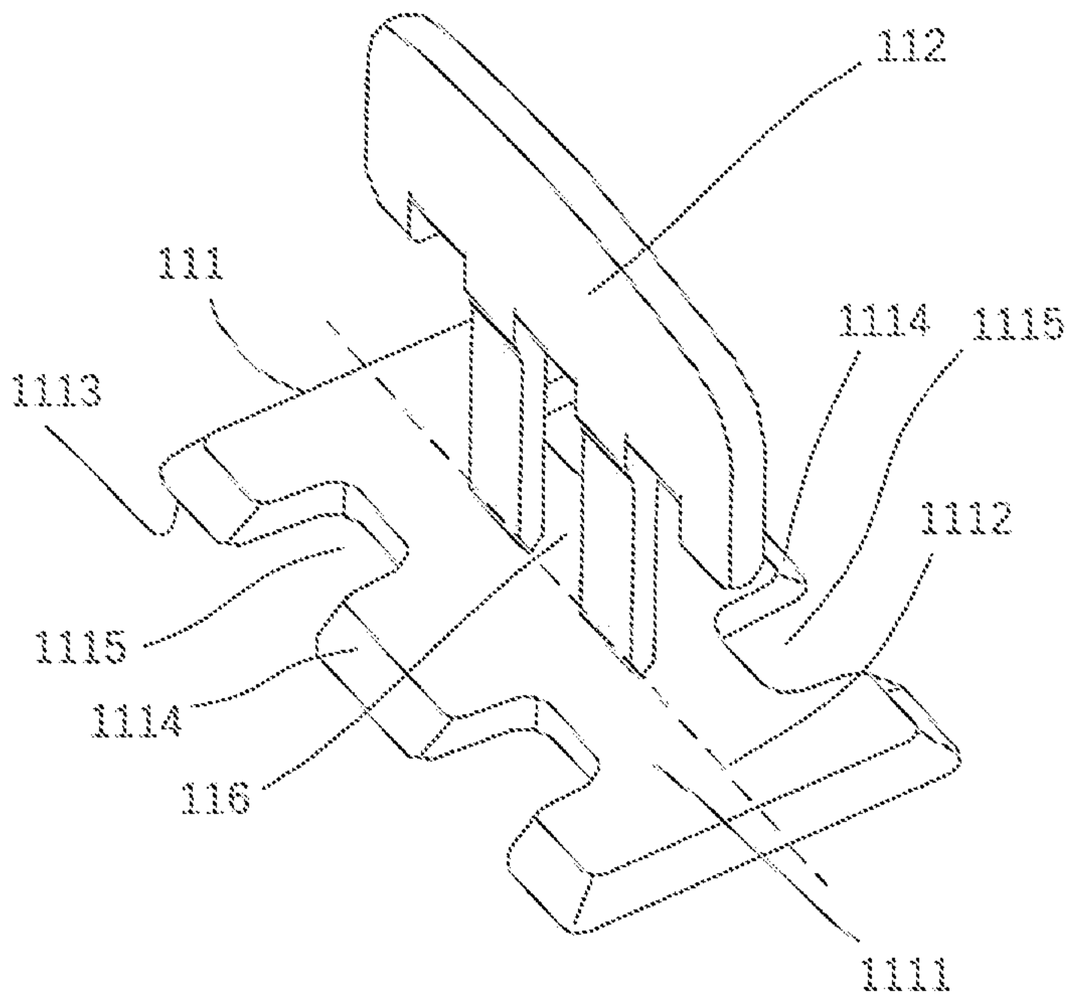
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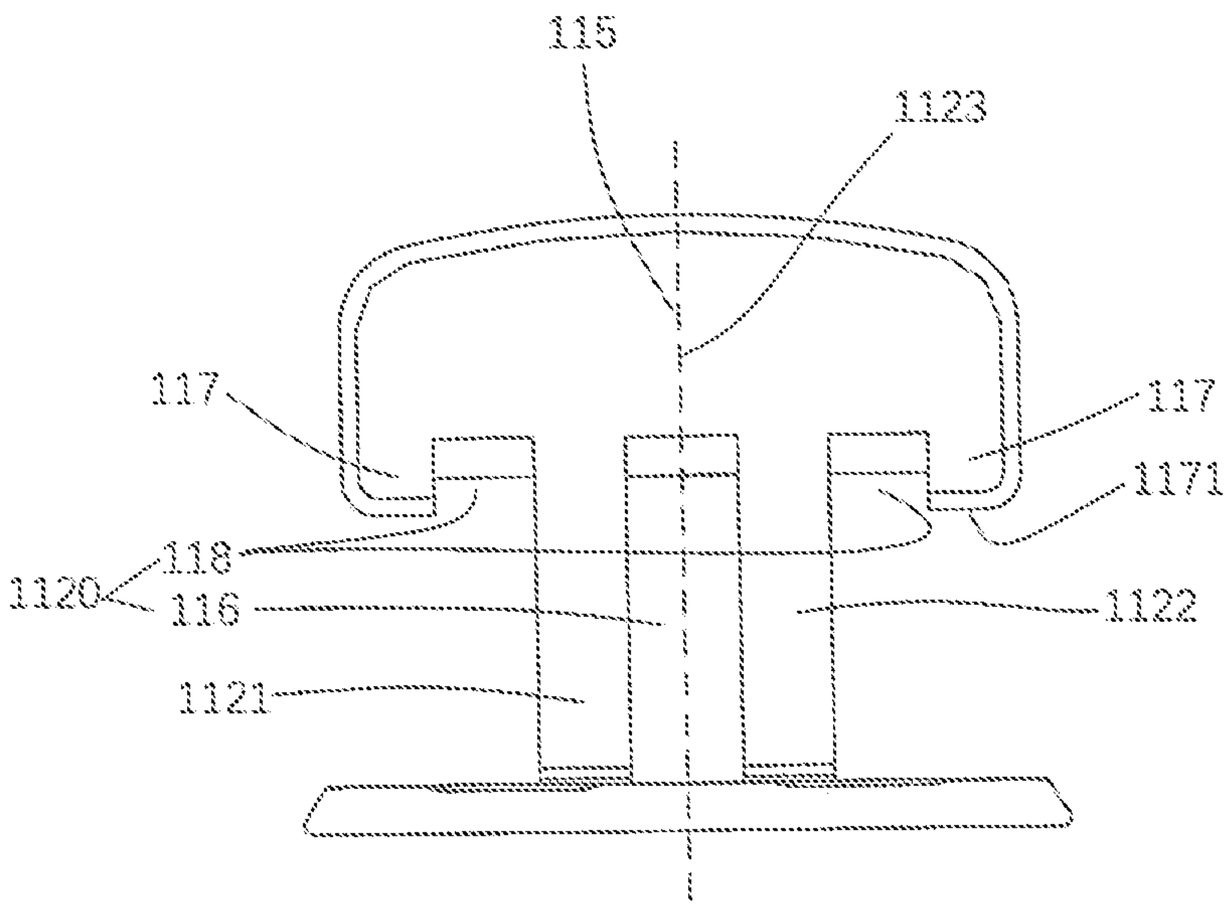
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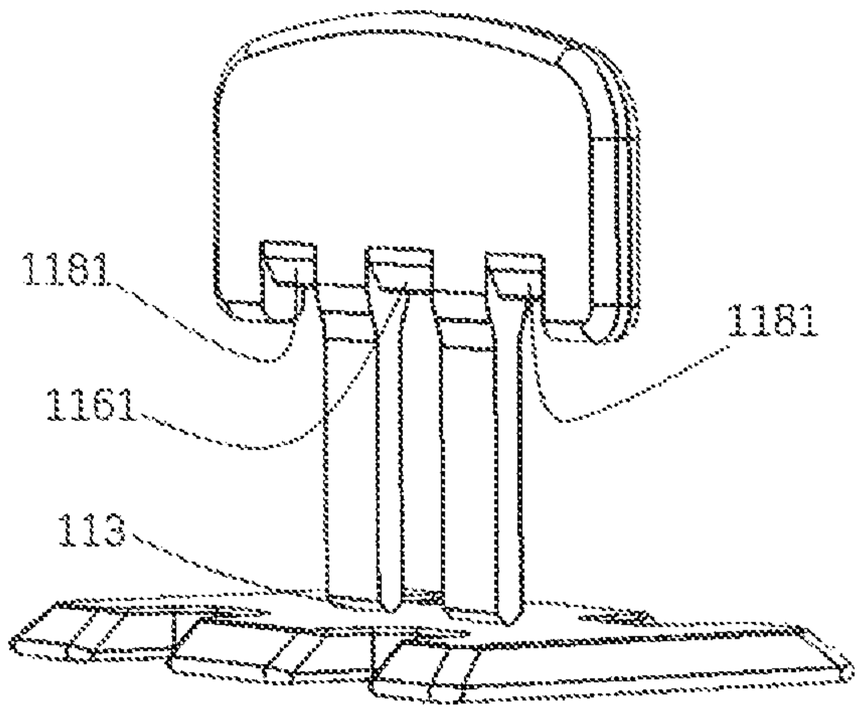

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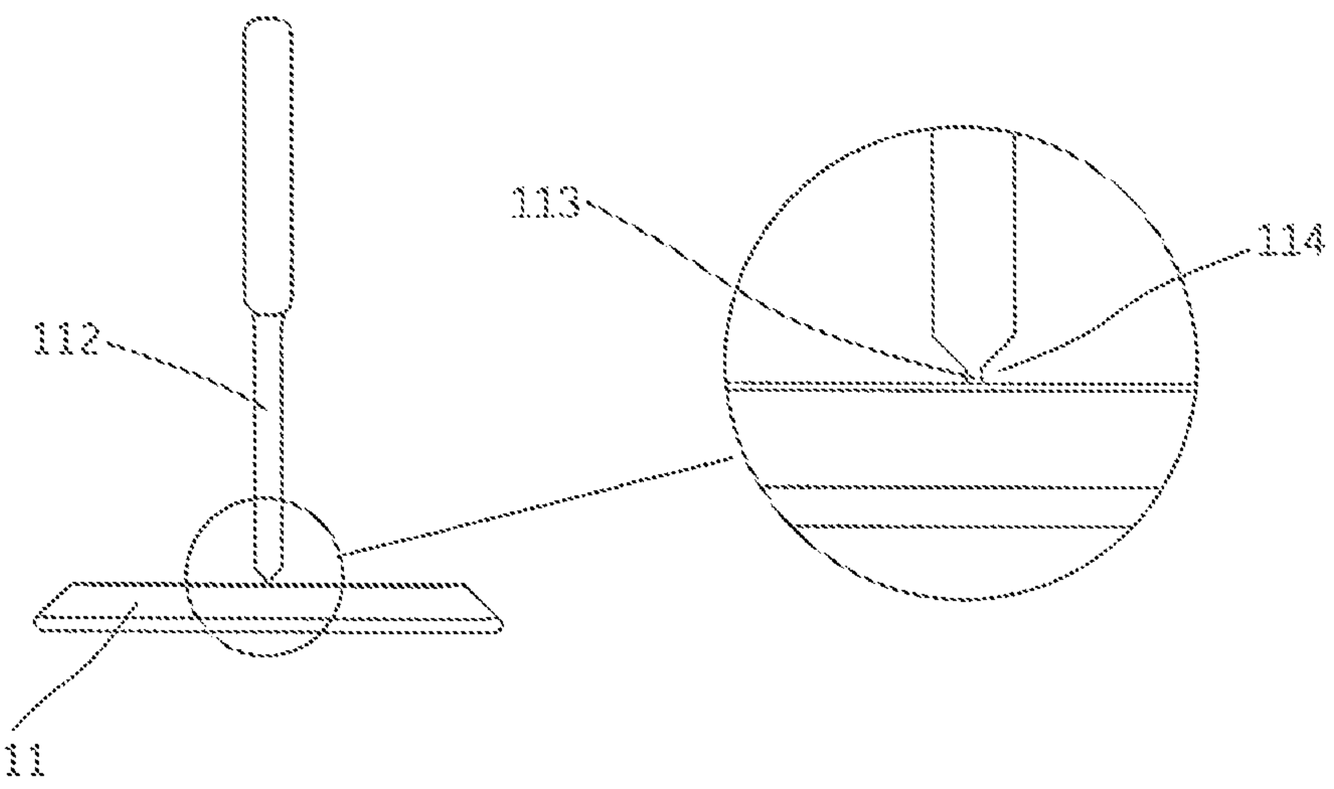

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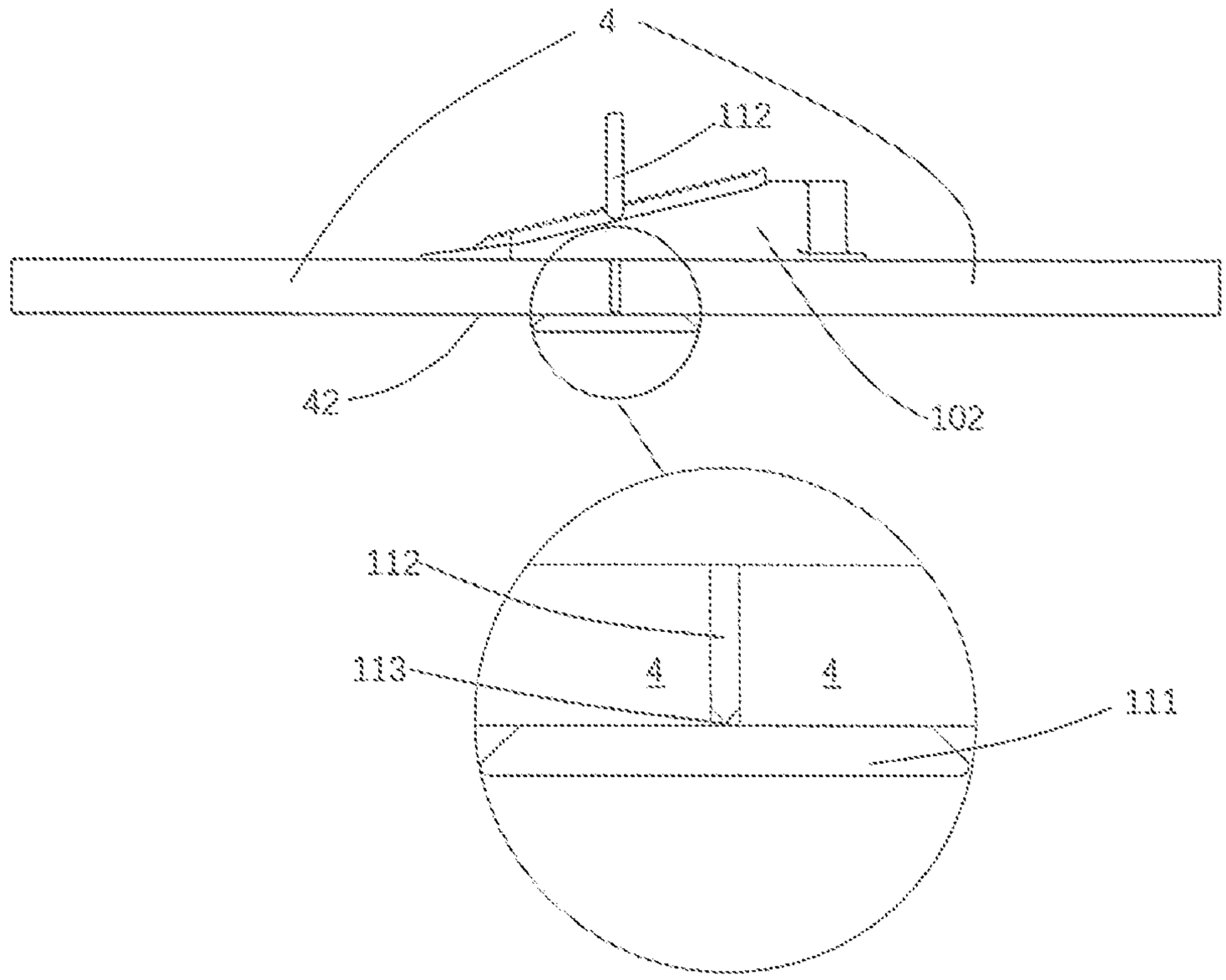
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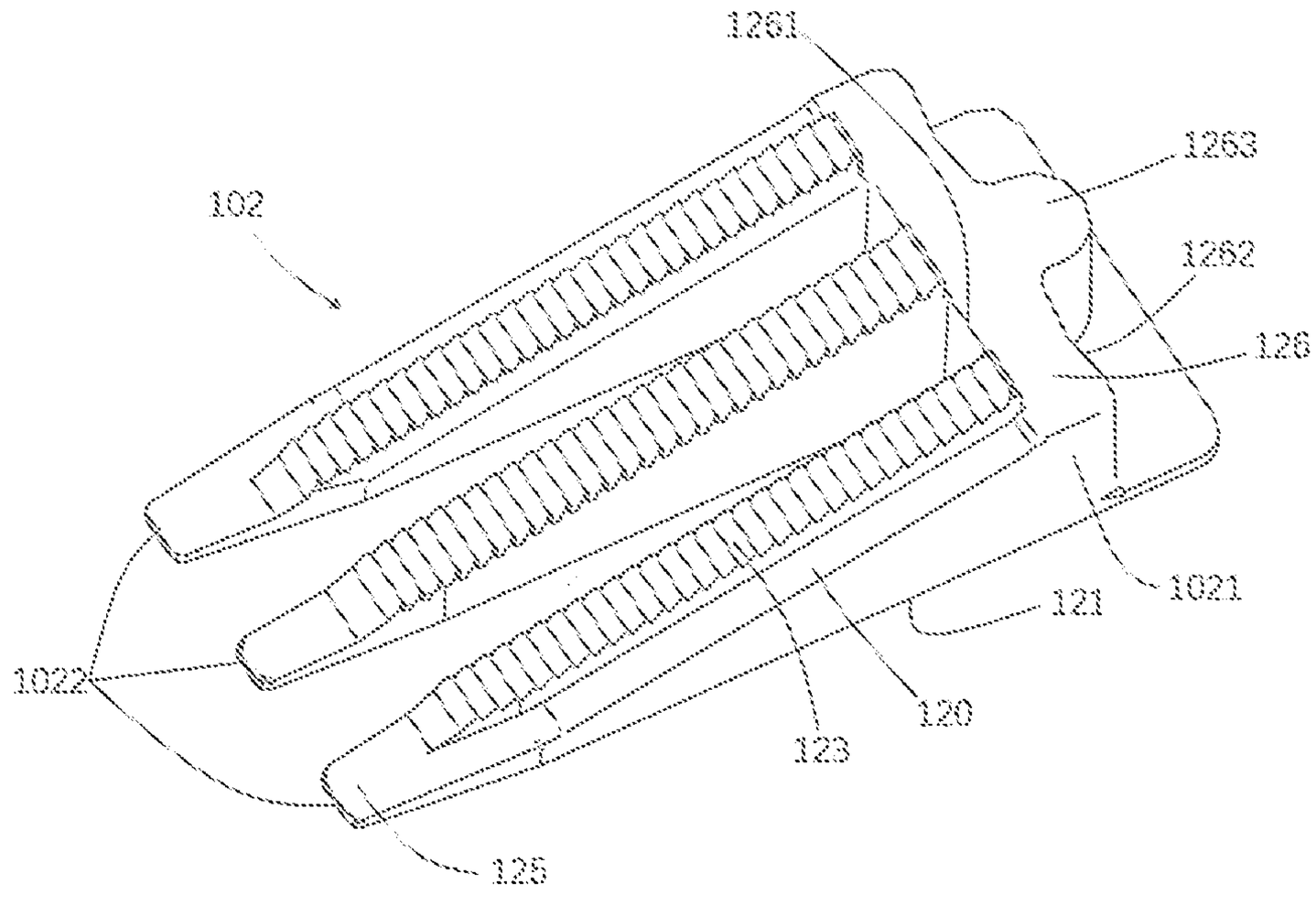
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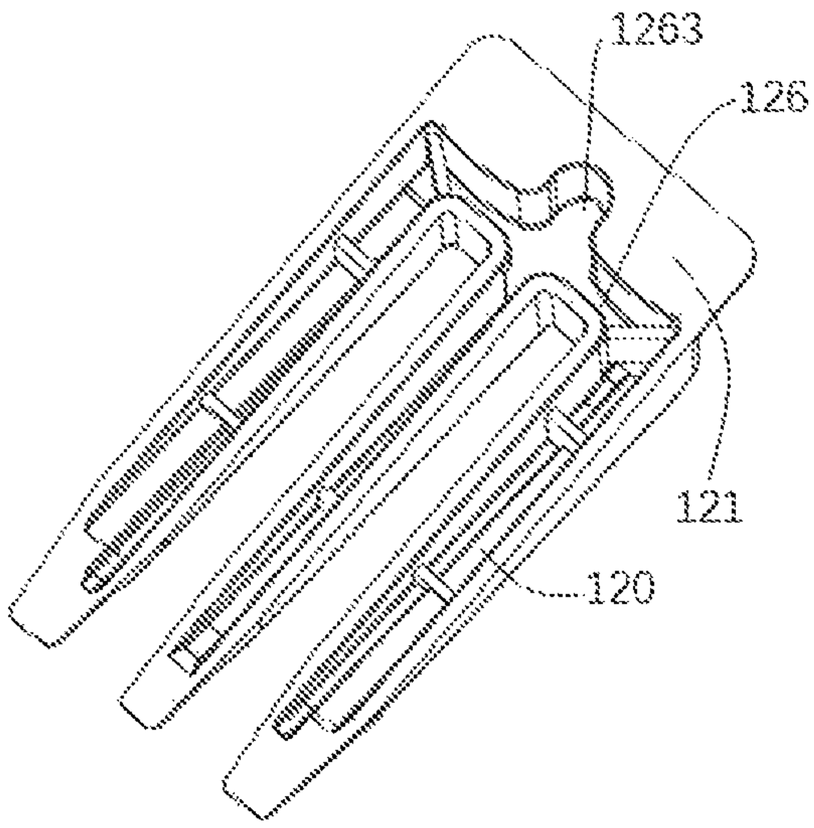

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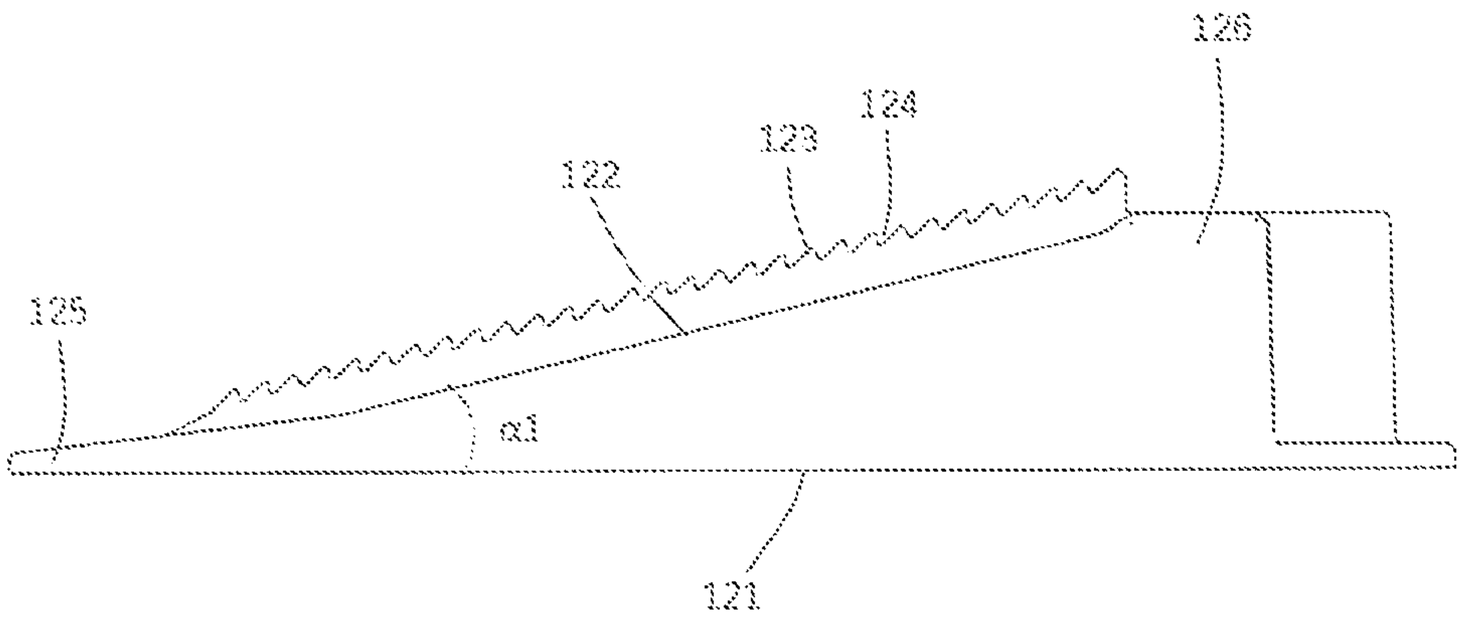

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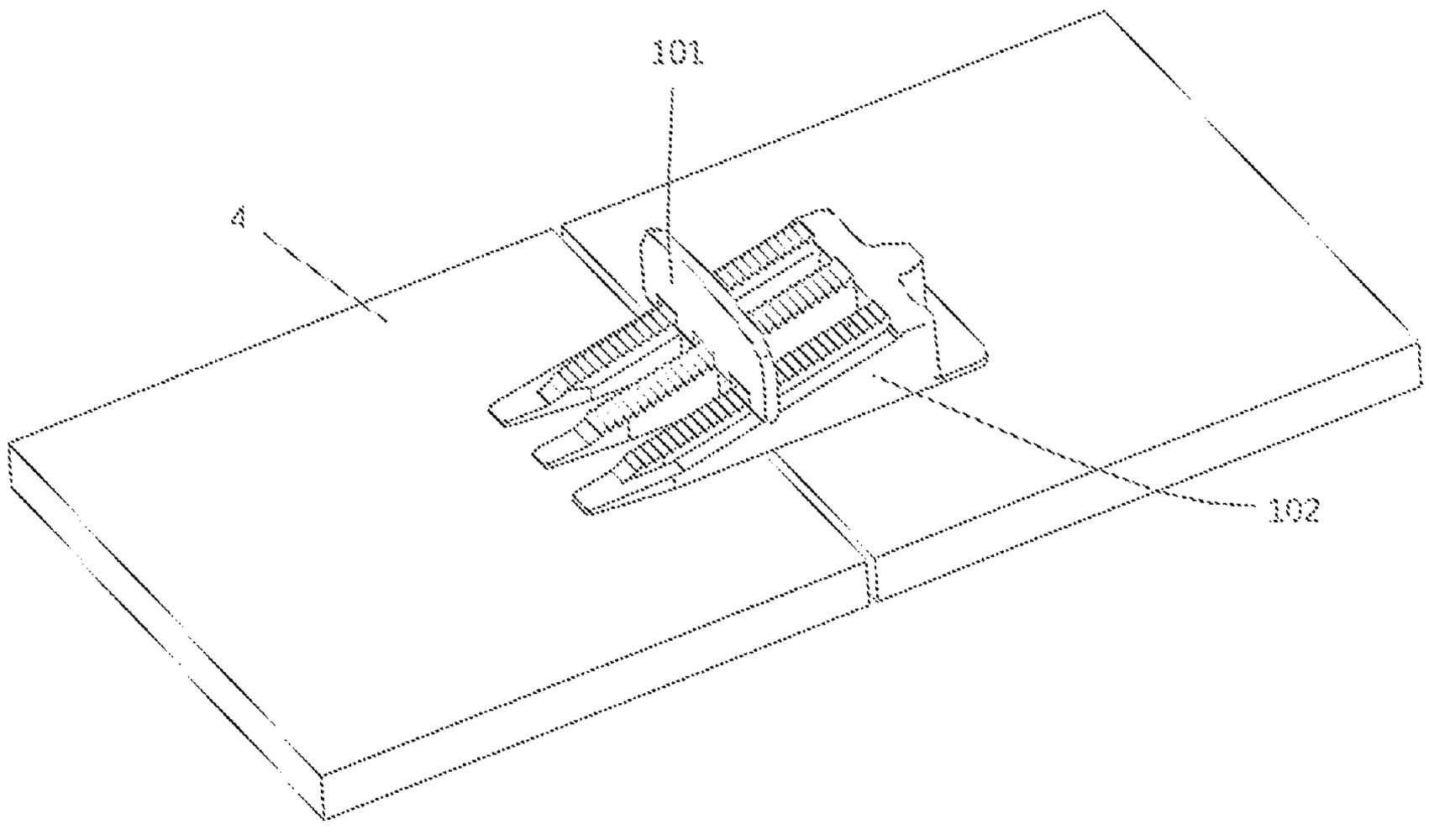

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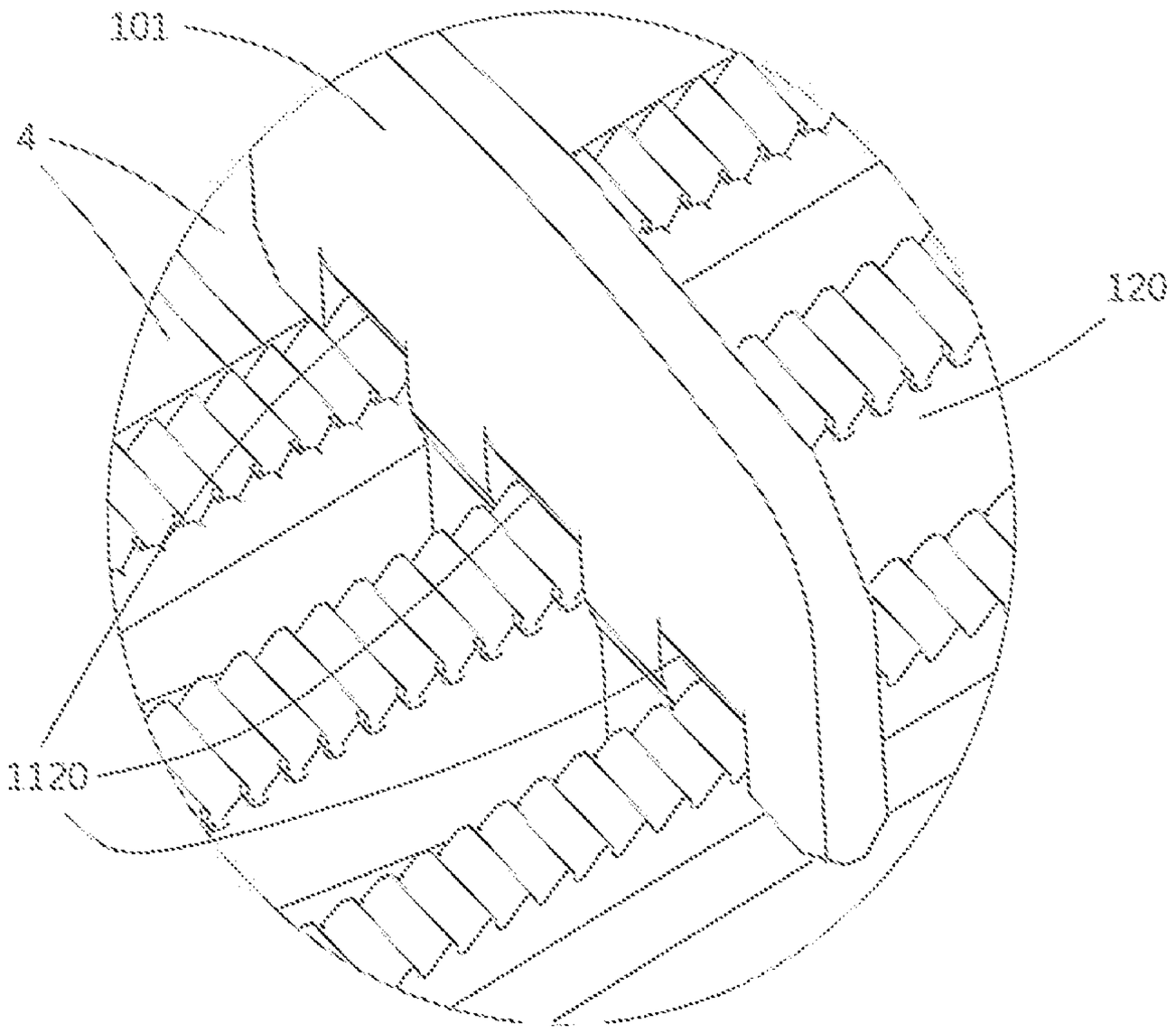
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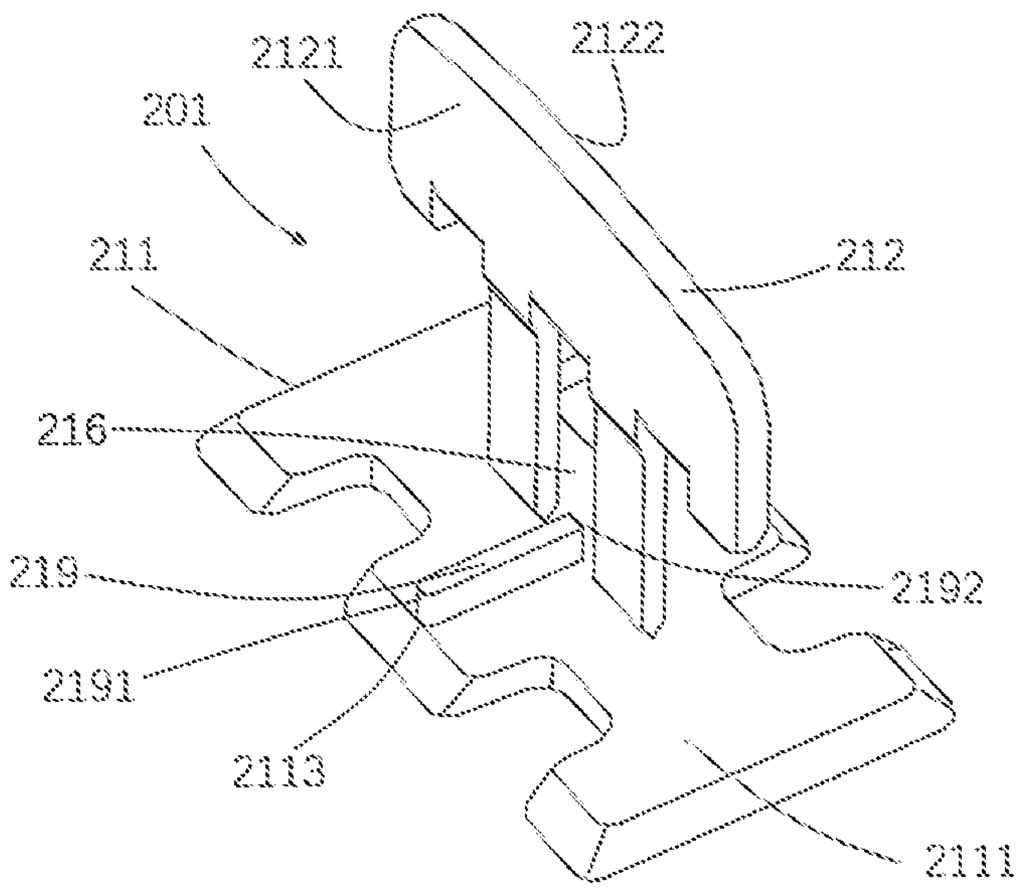
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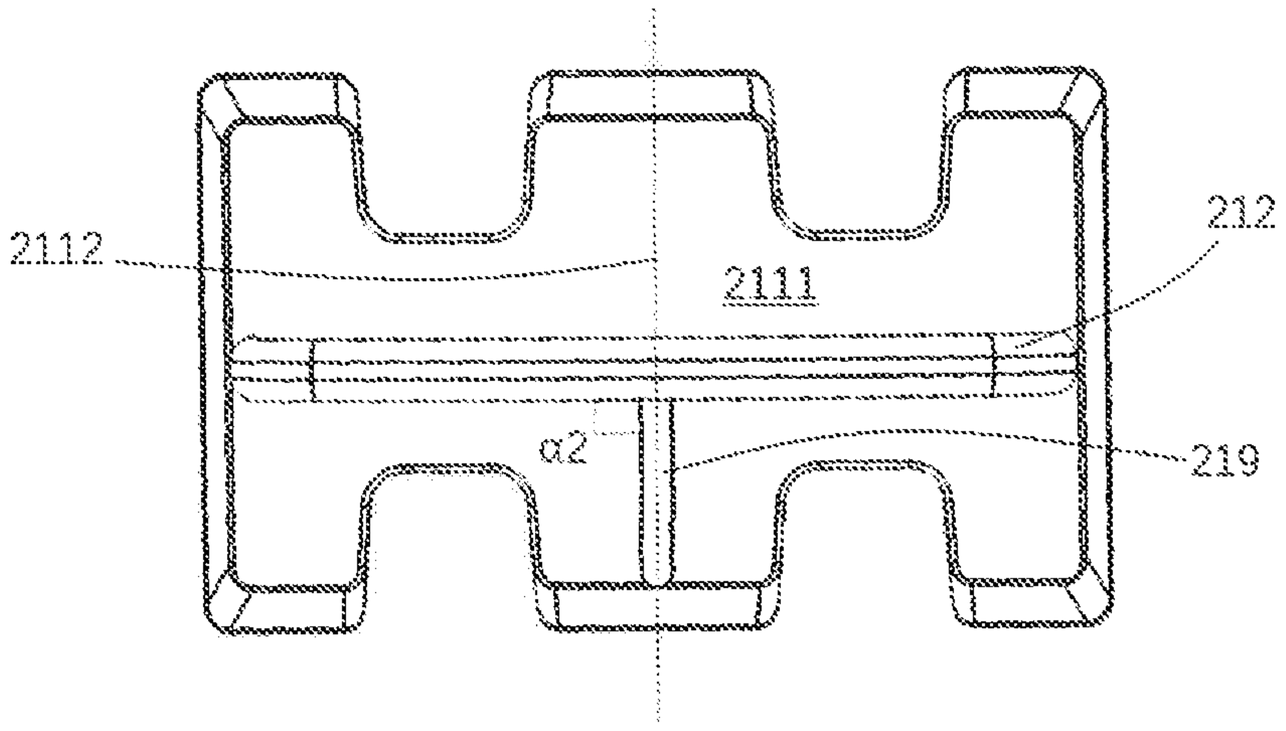

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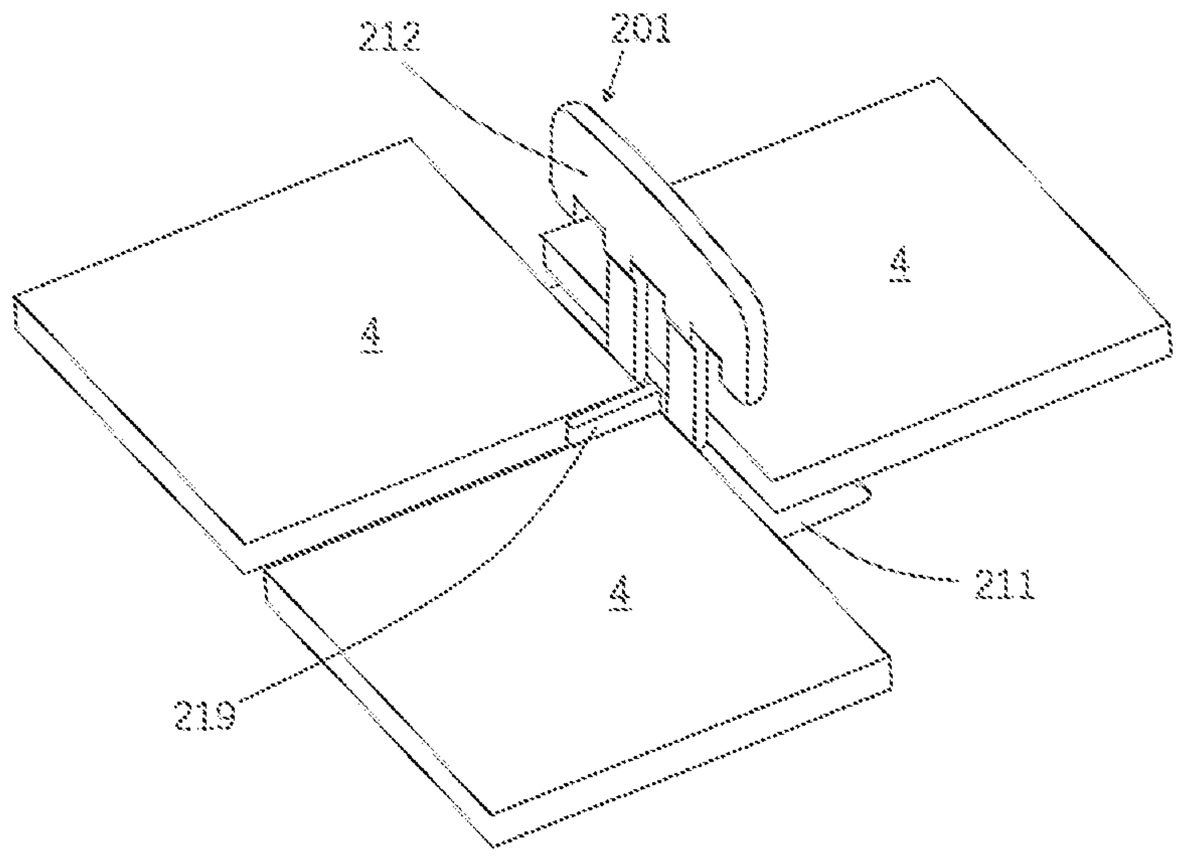

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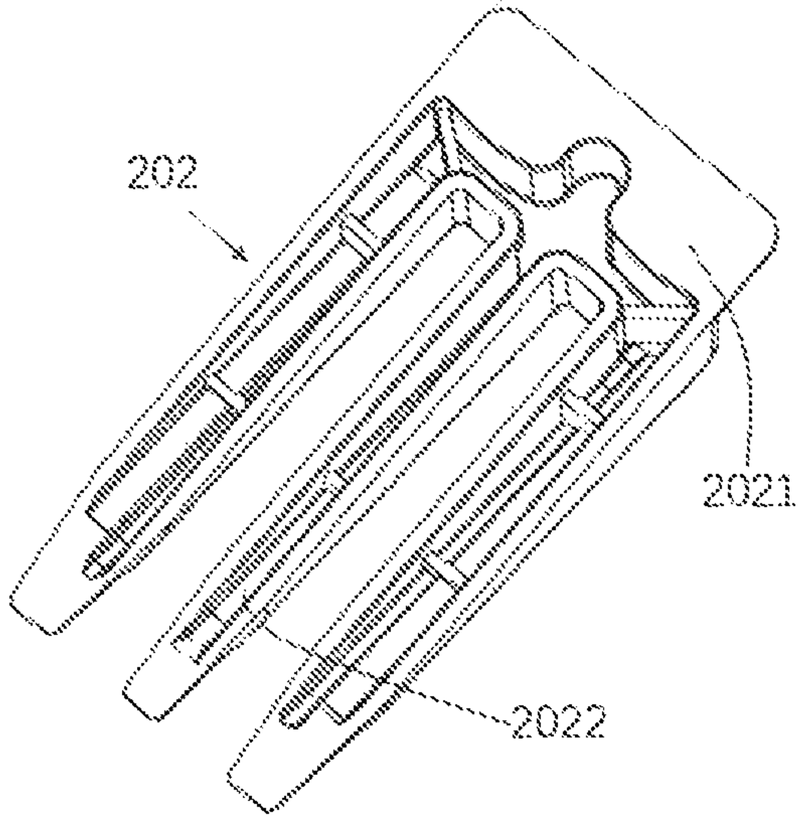

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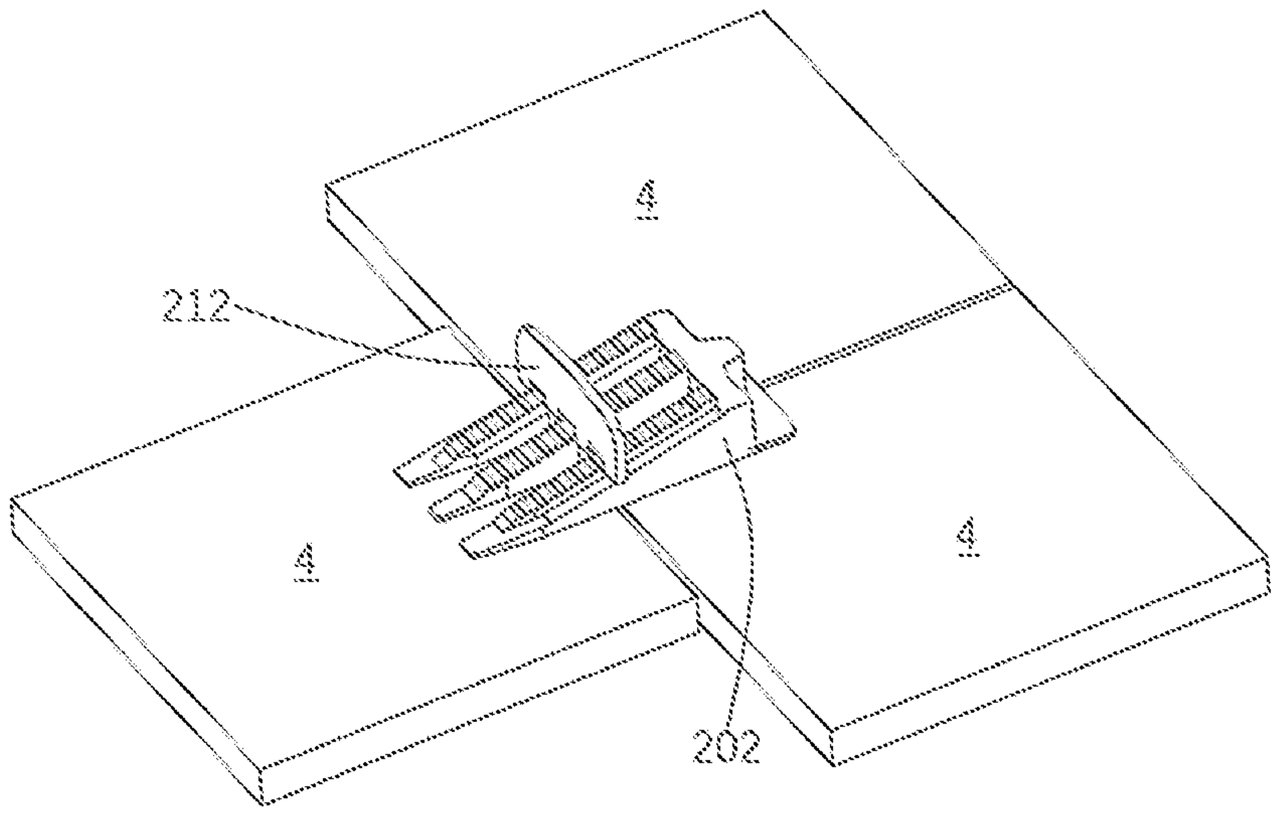

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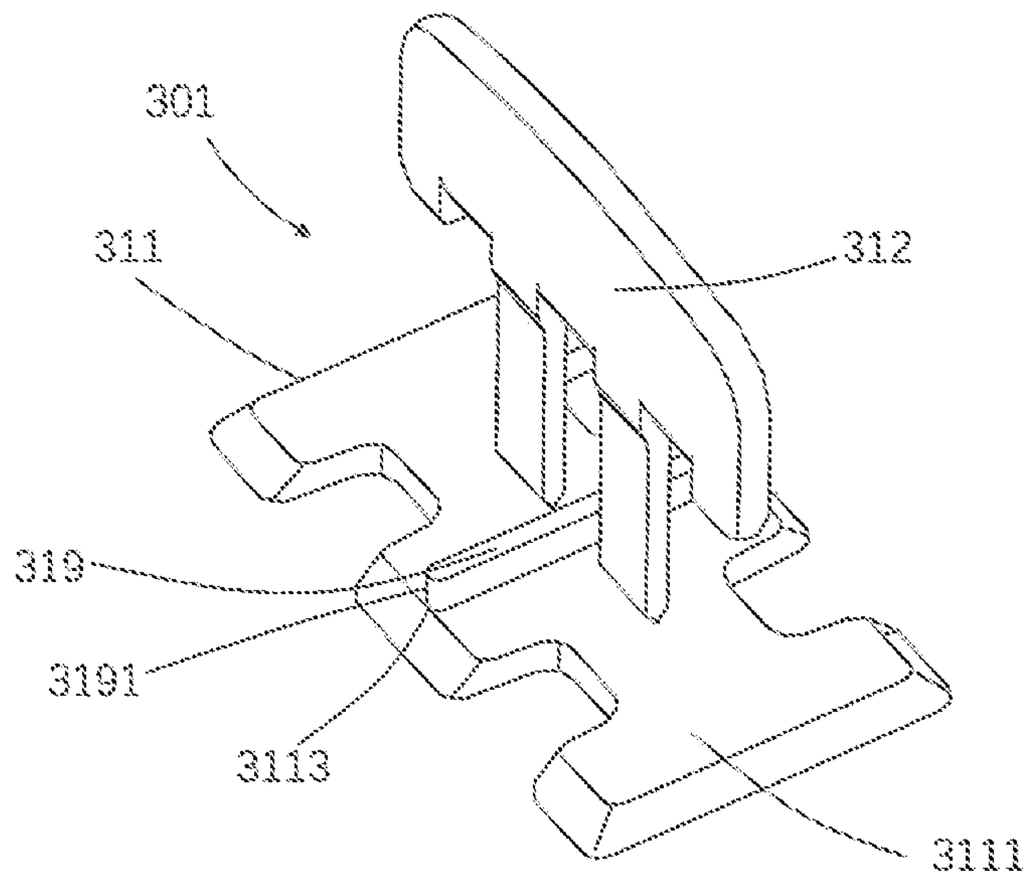

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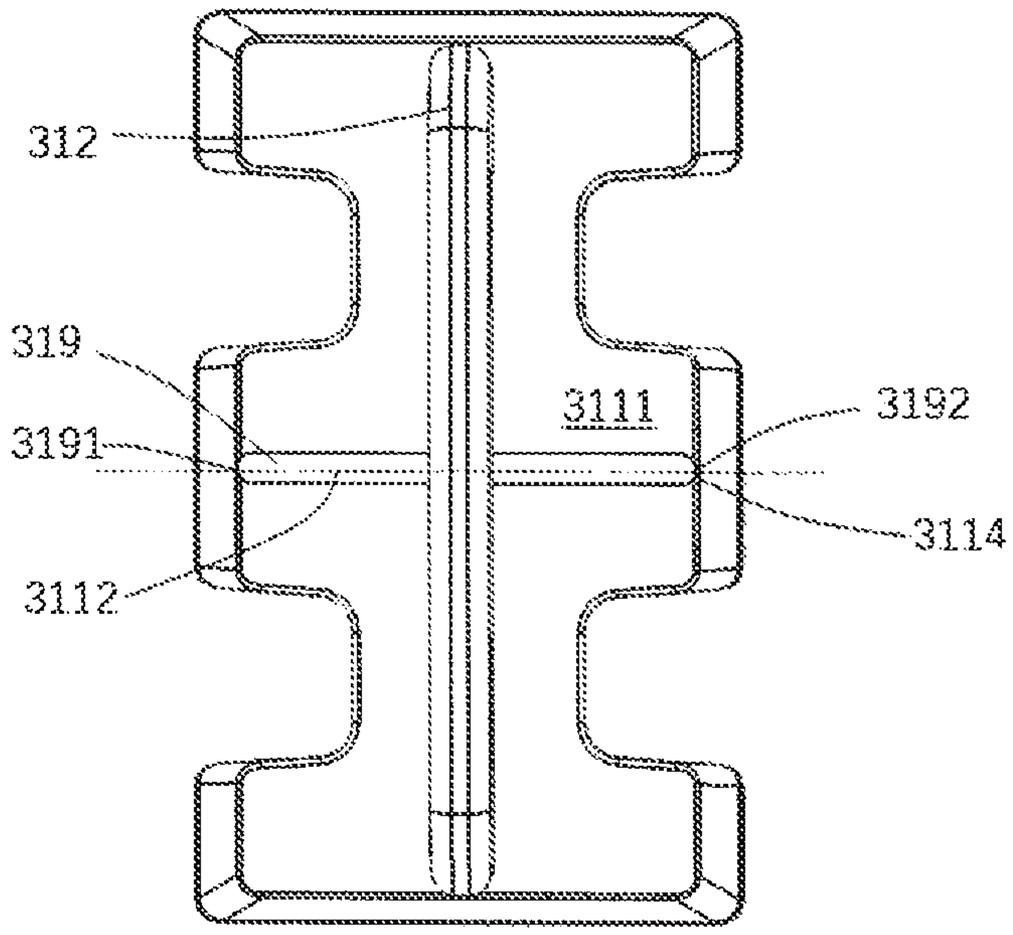

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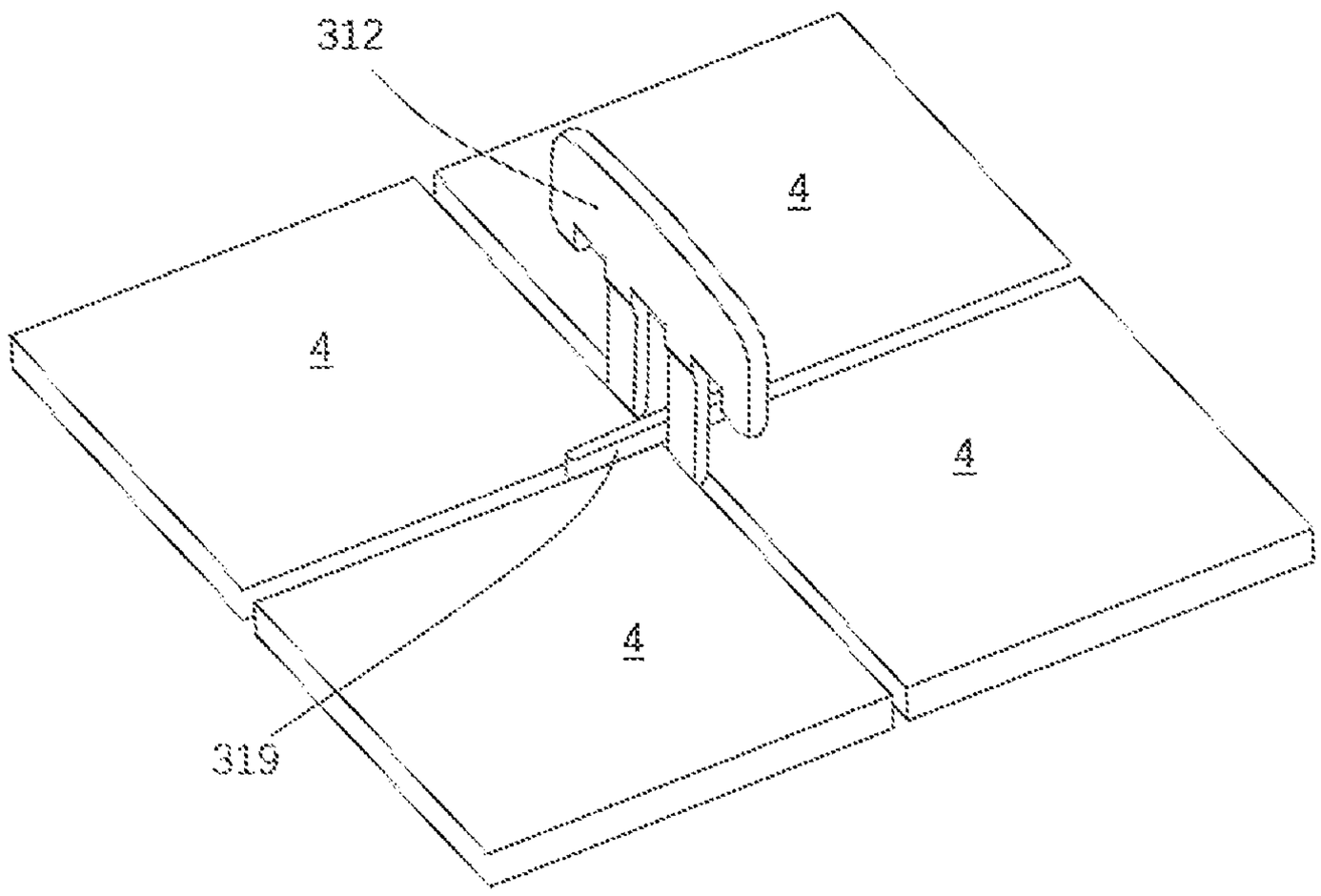

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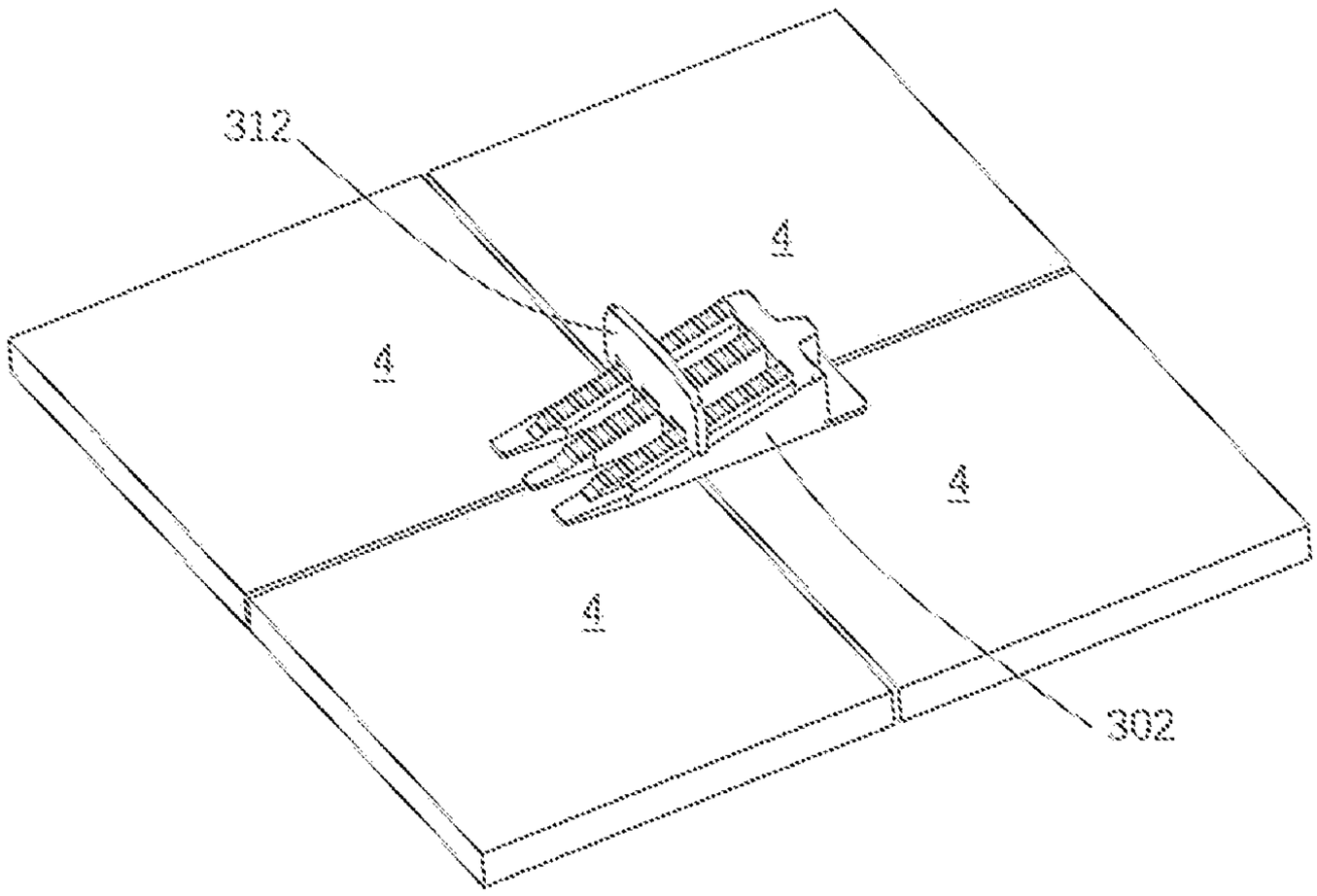

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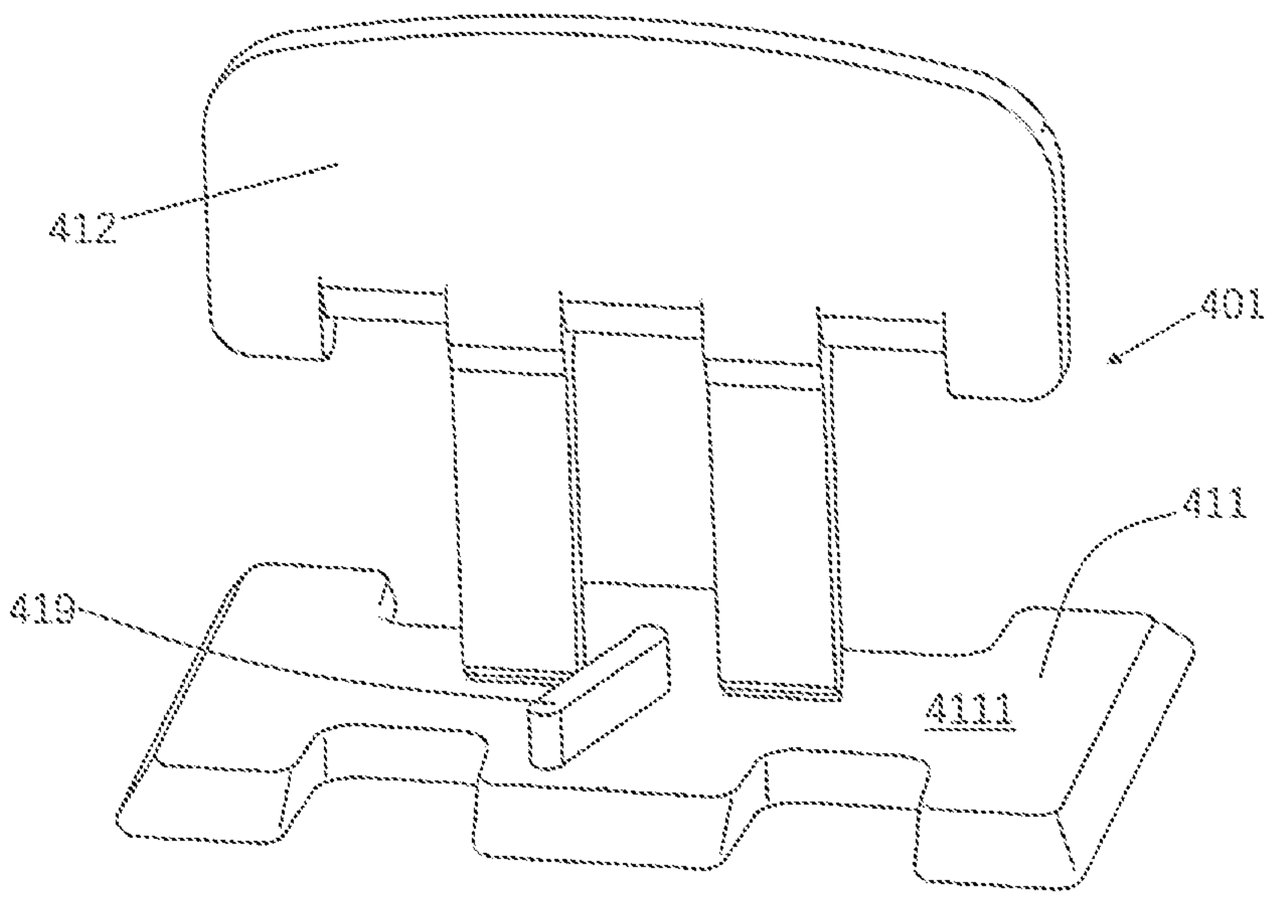

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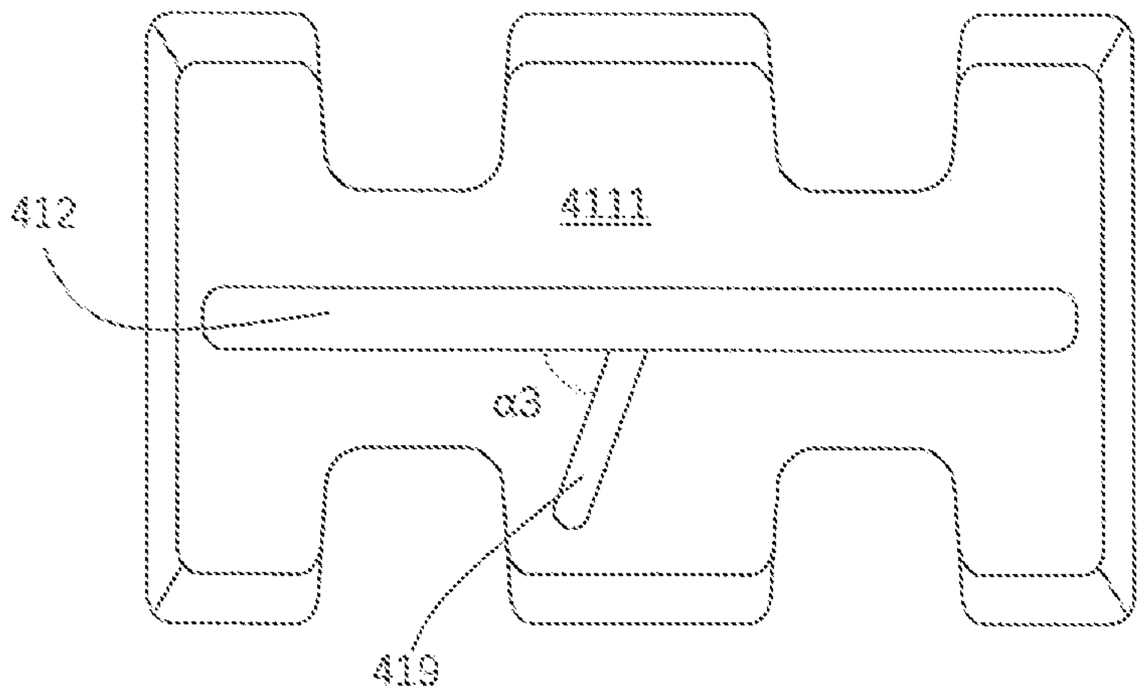

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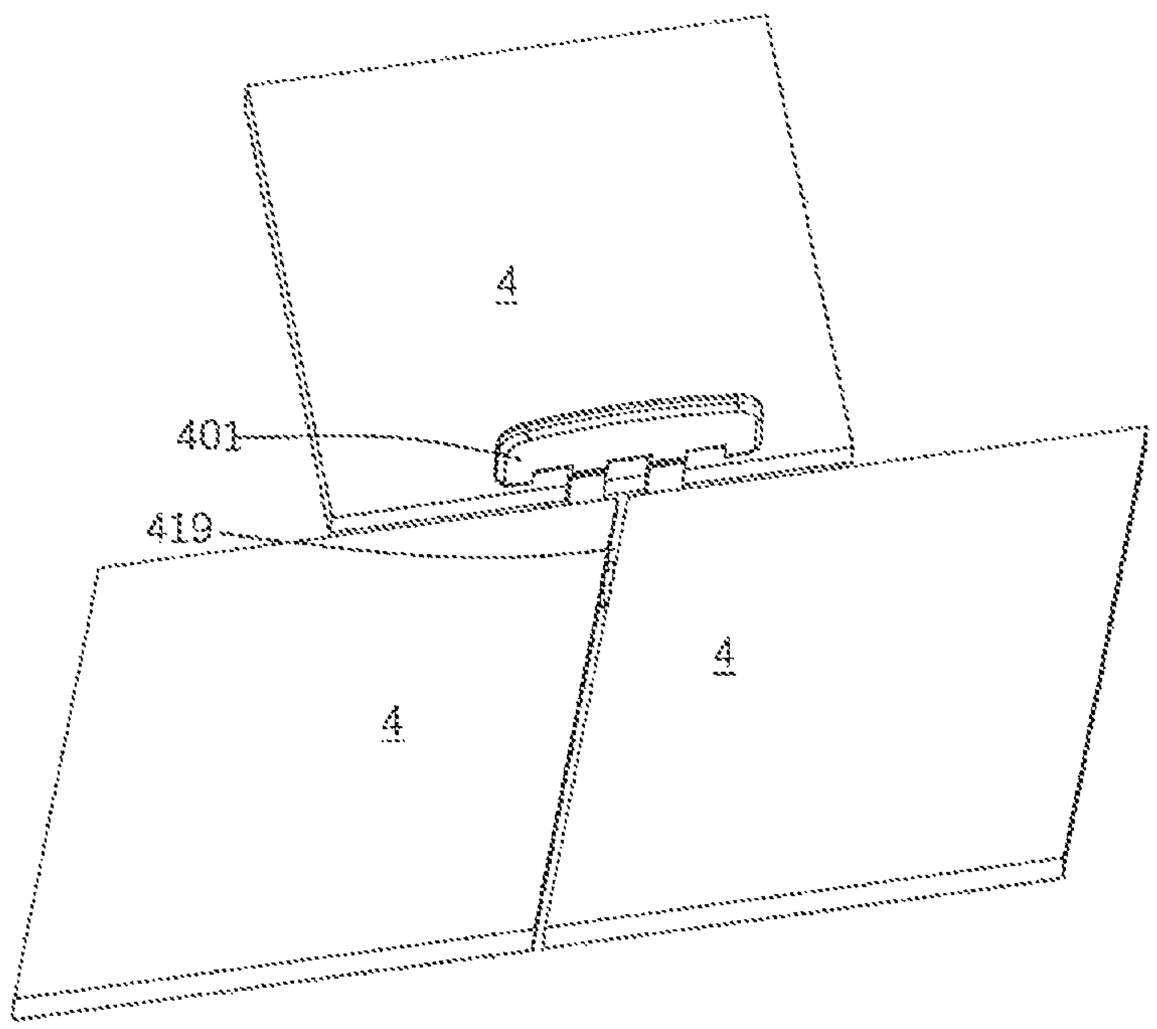

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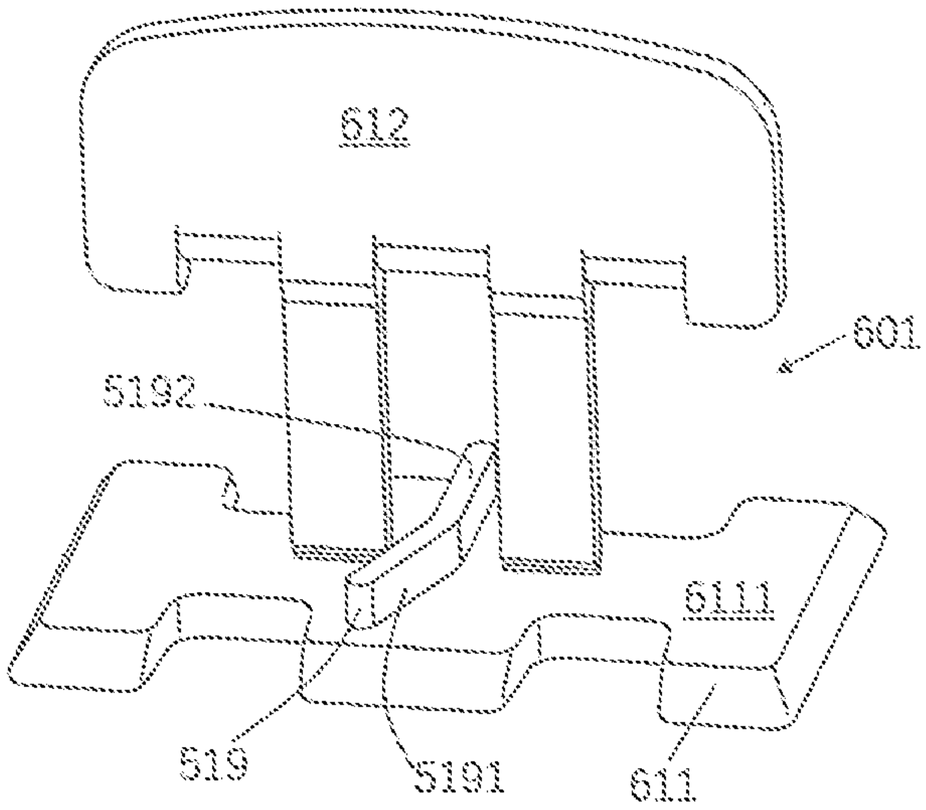

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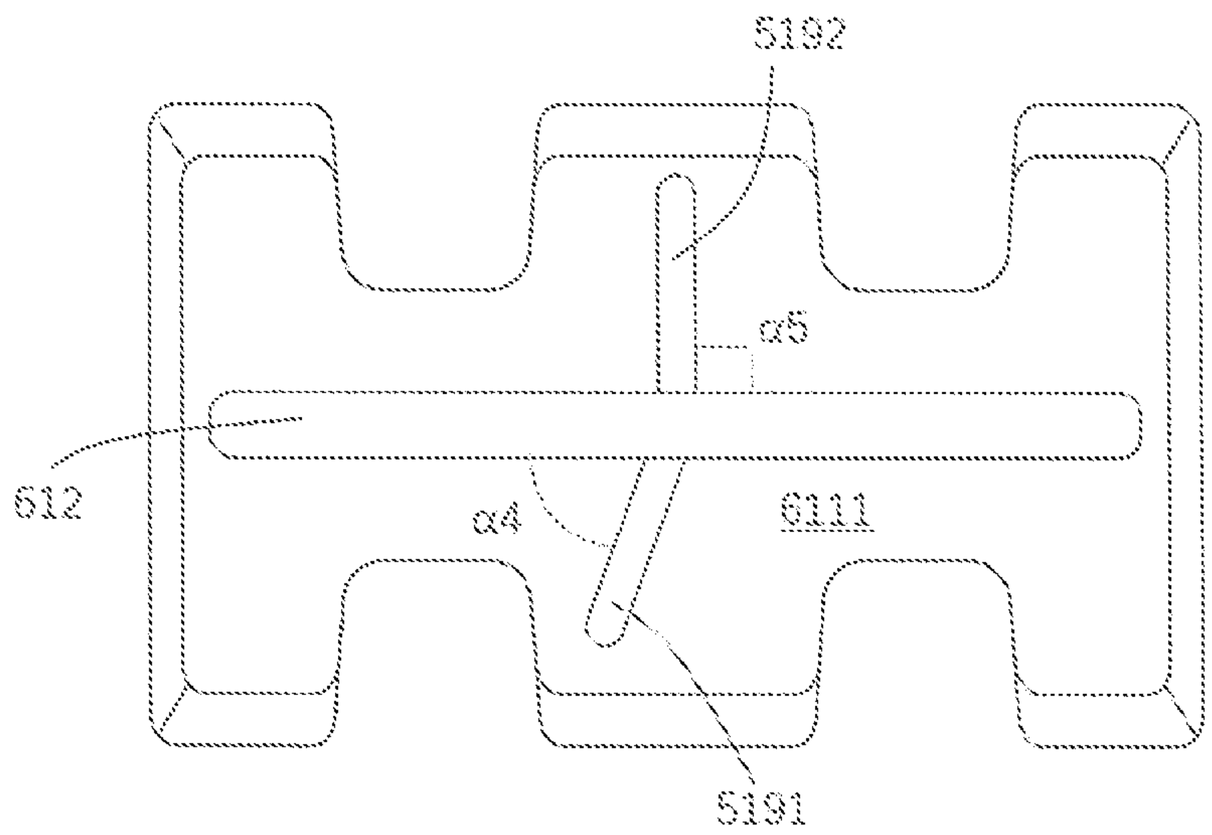

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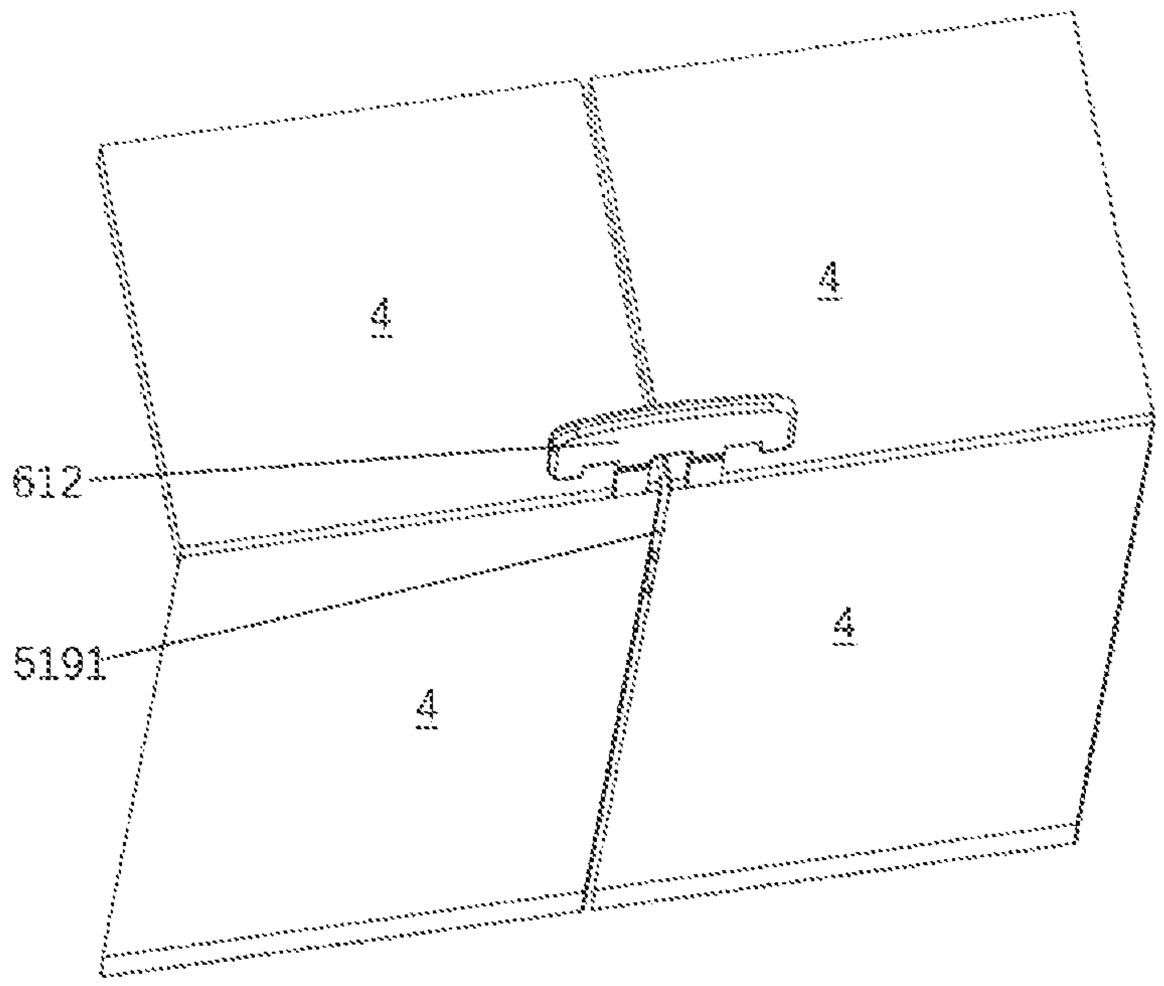
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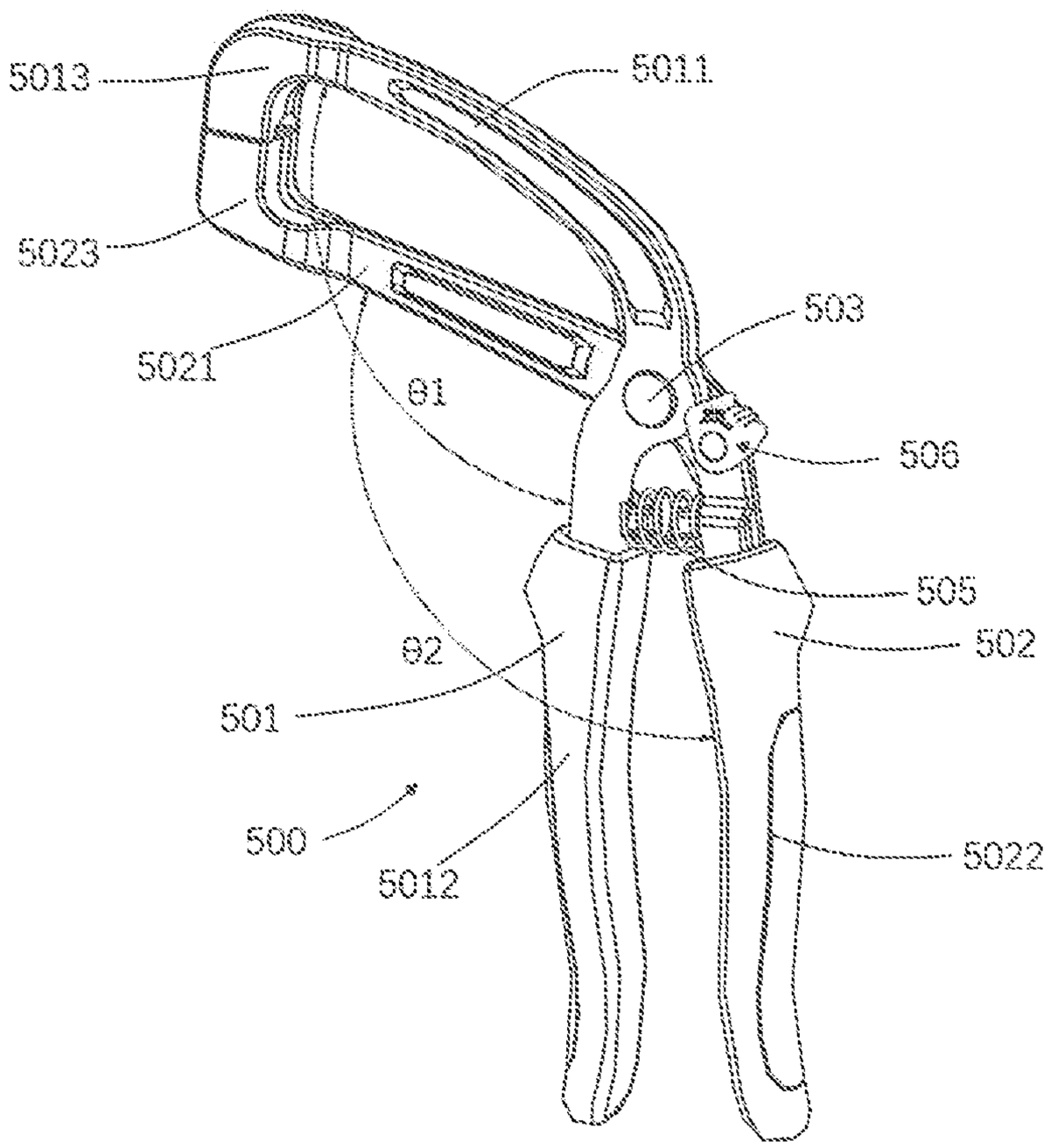
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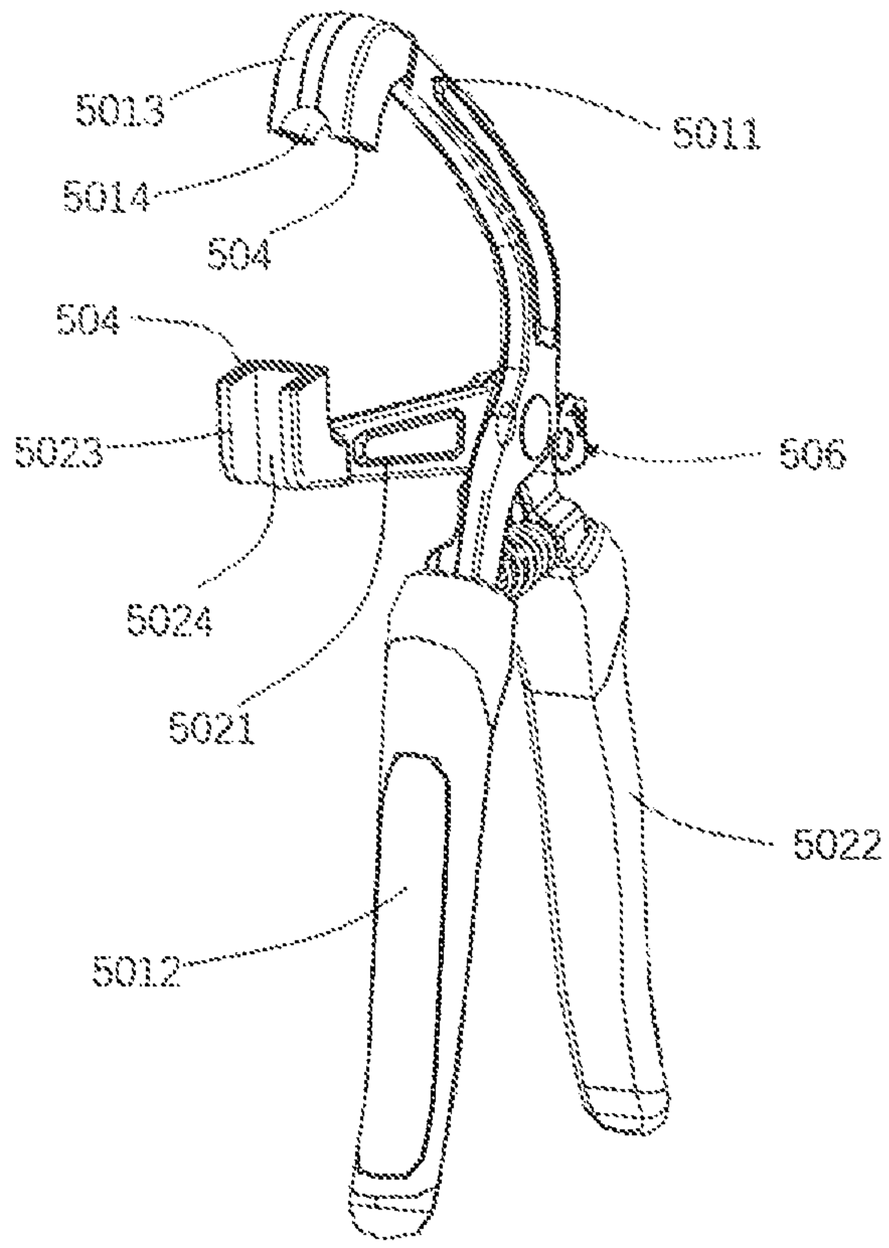
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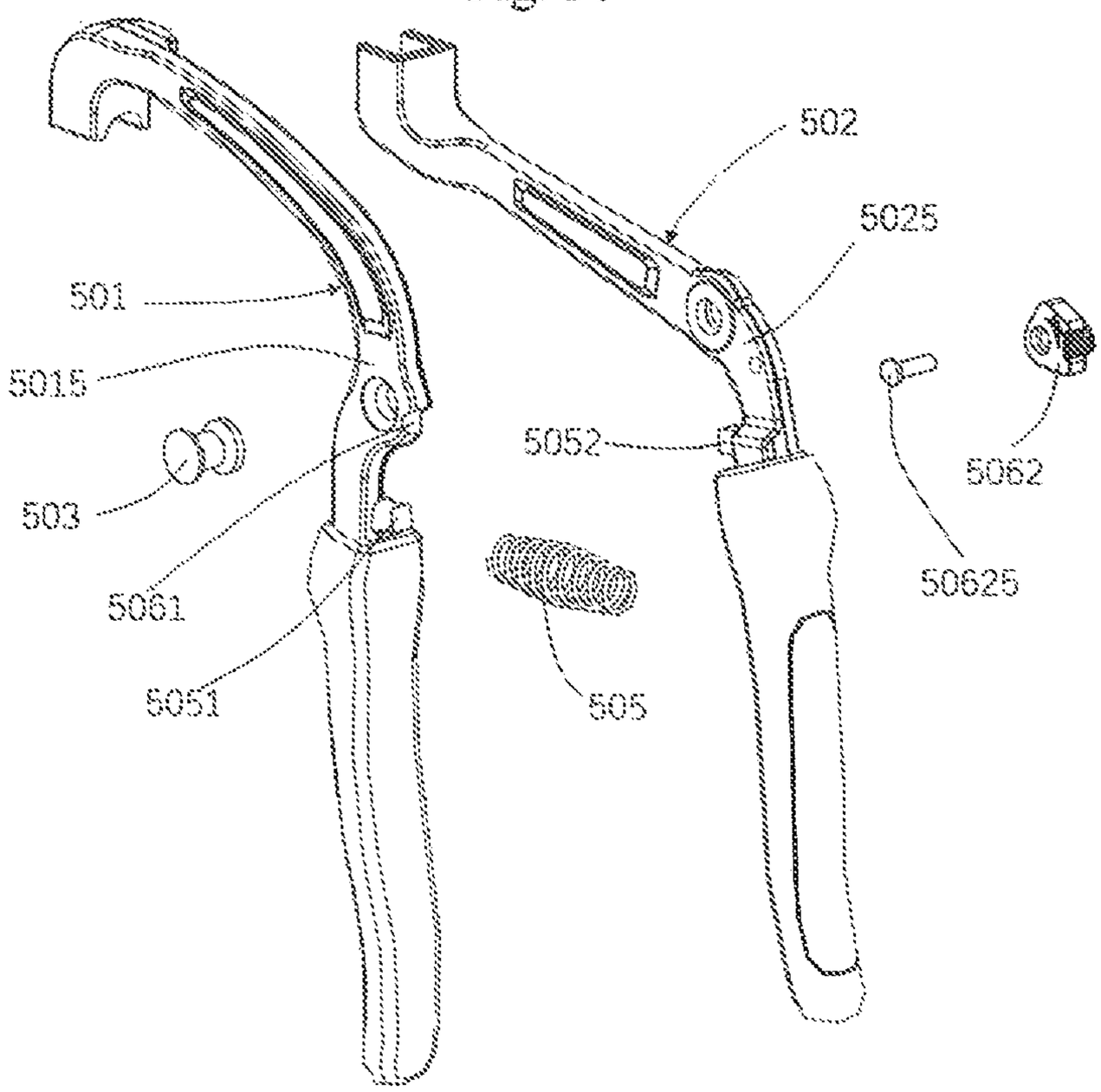
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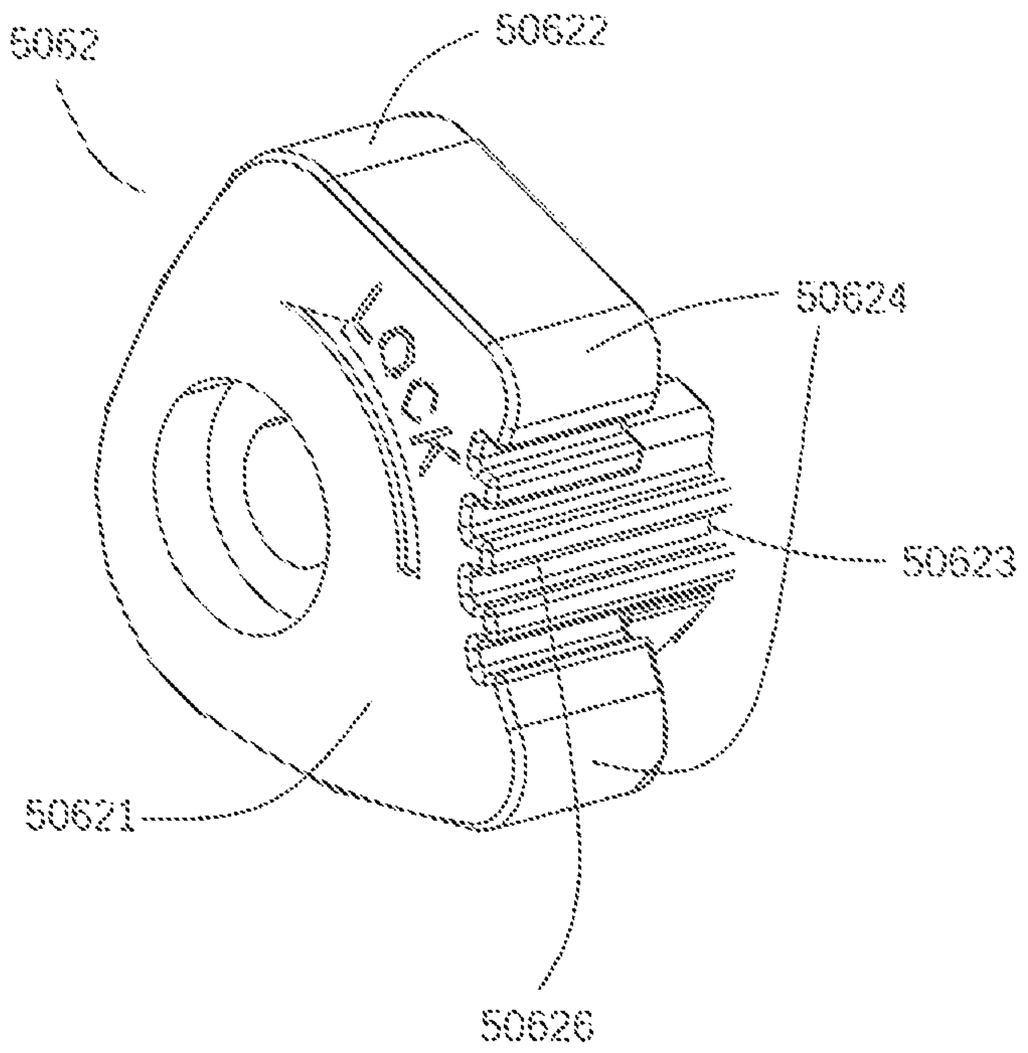
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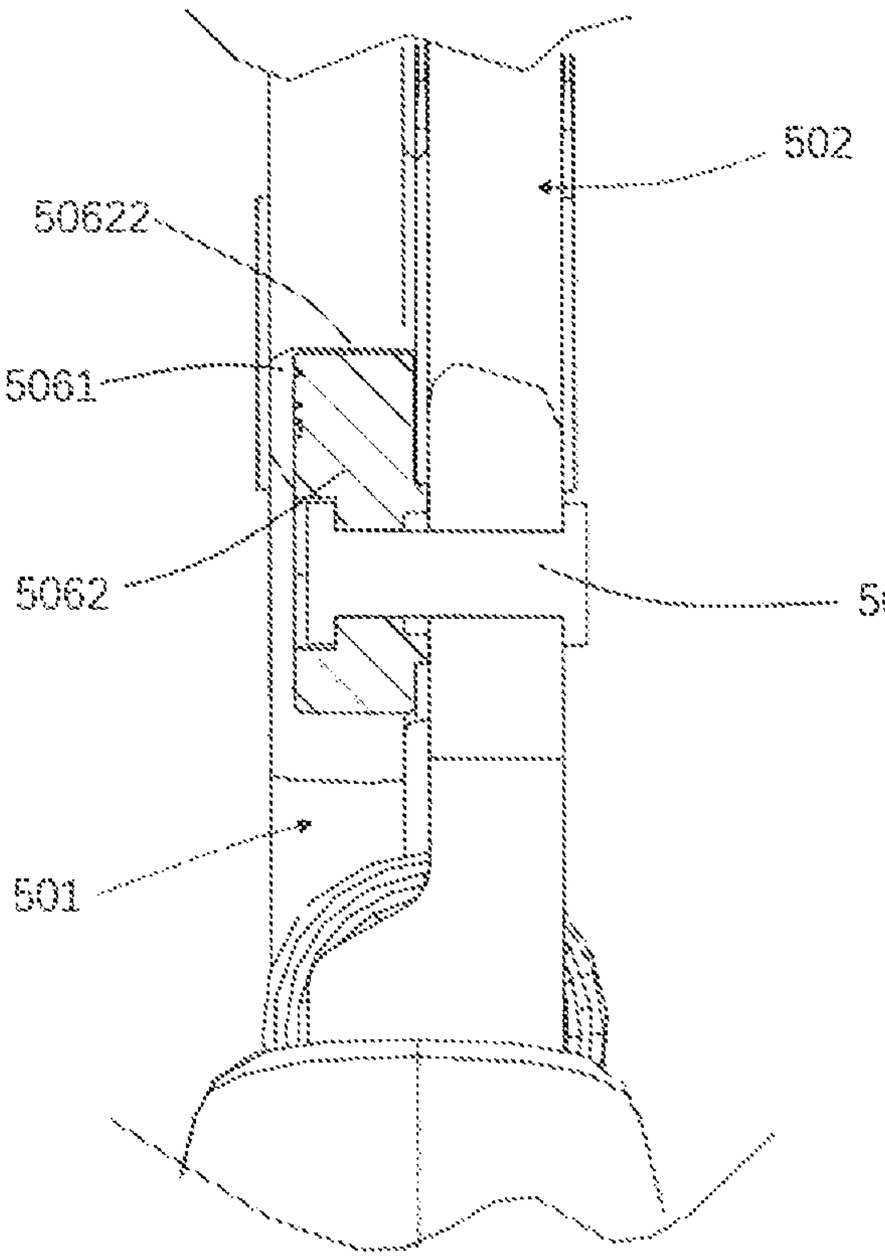
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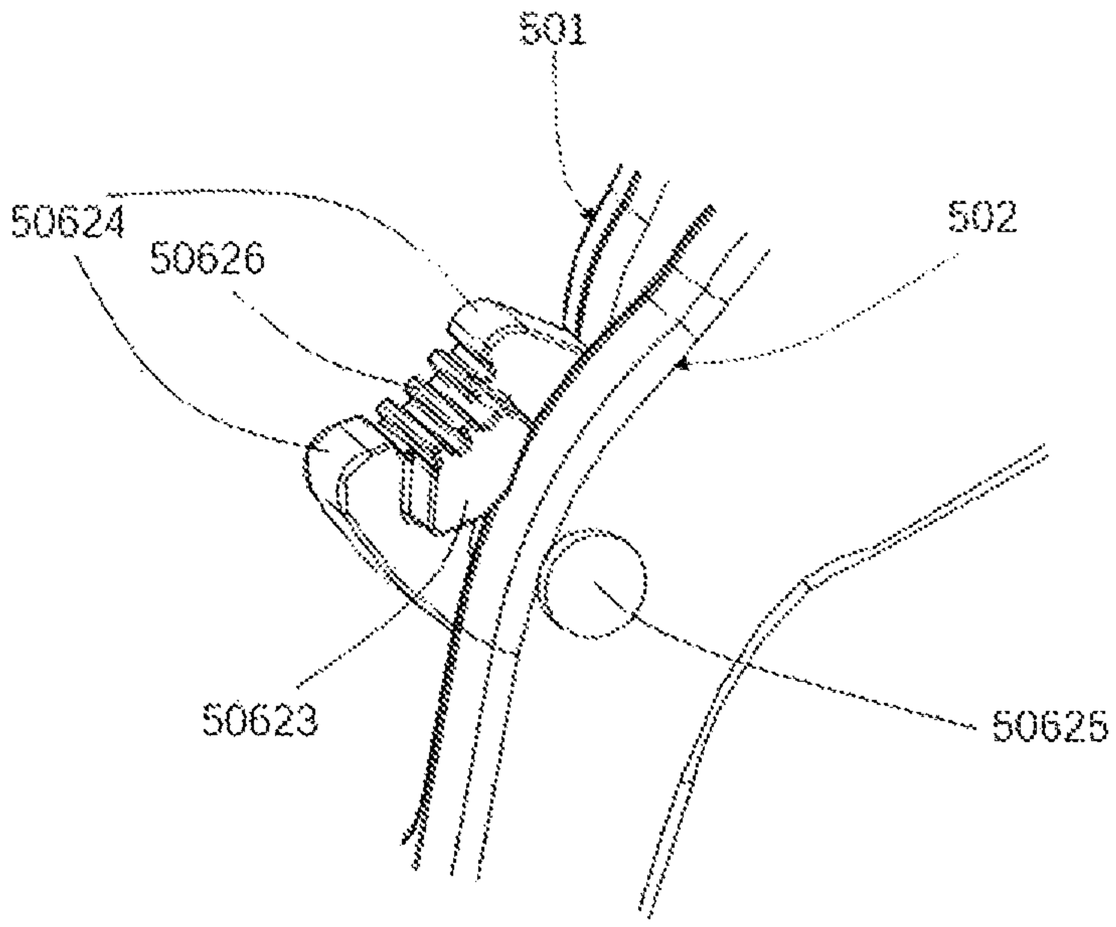

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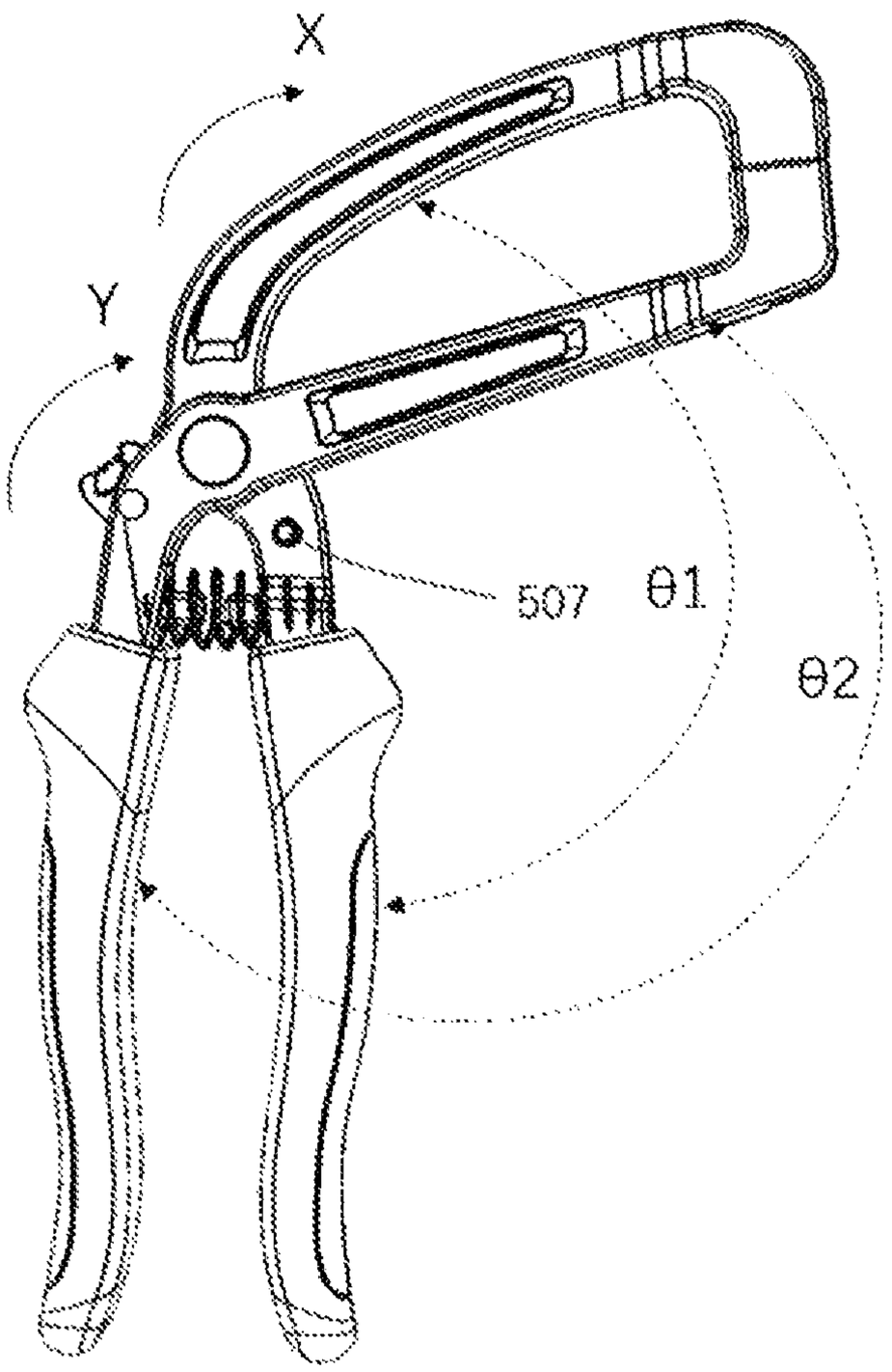

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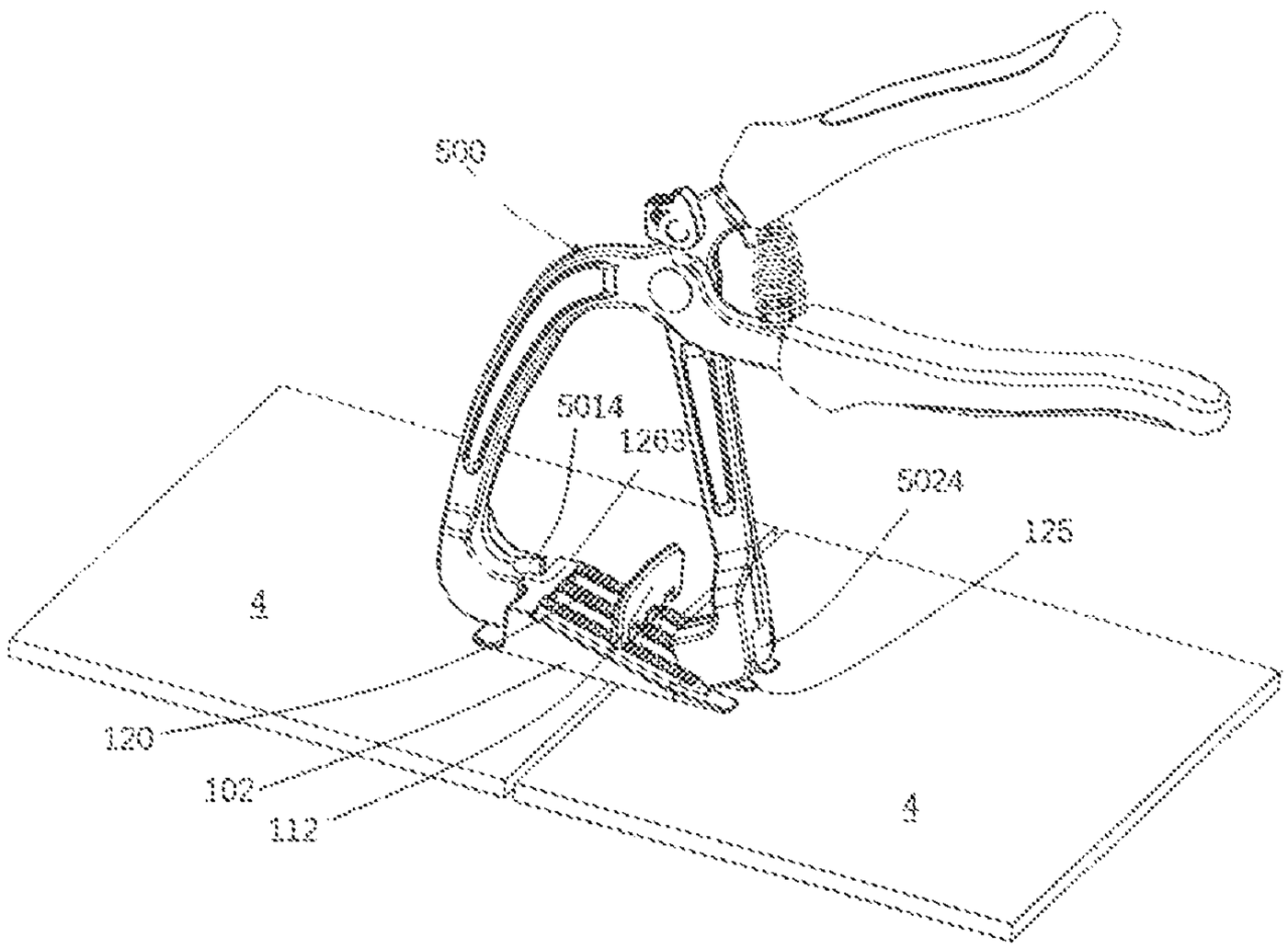
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Fig. 44

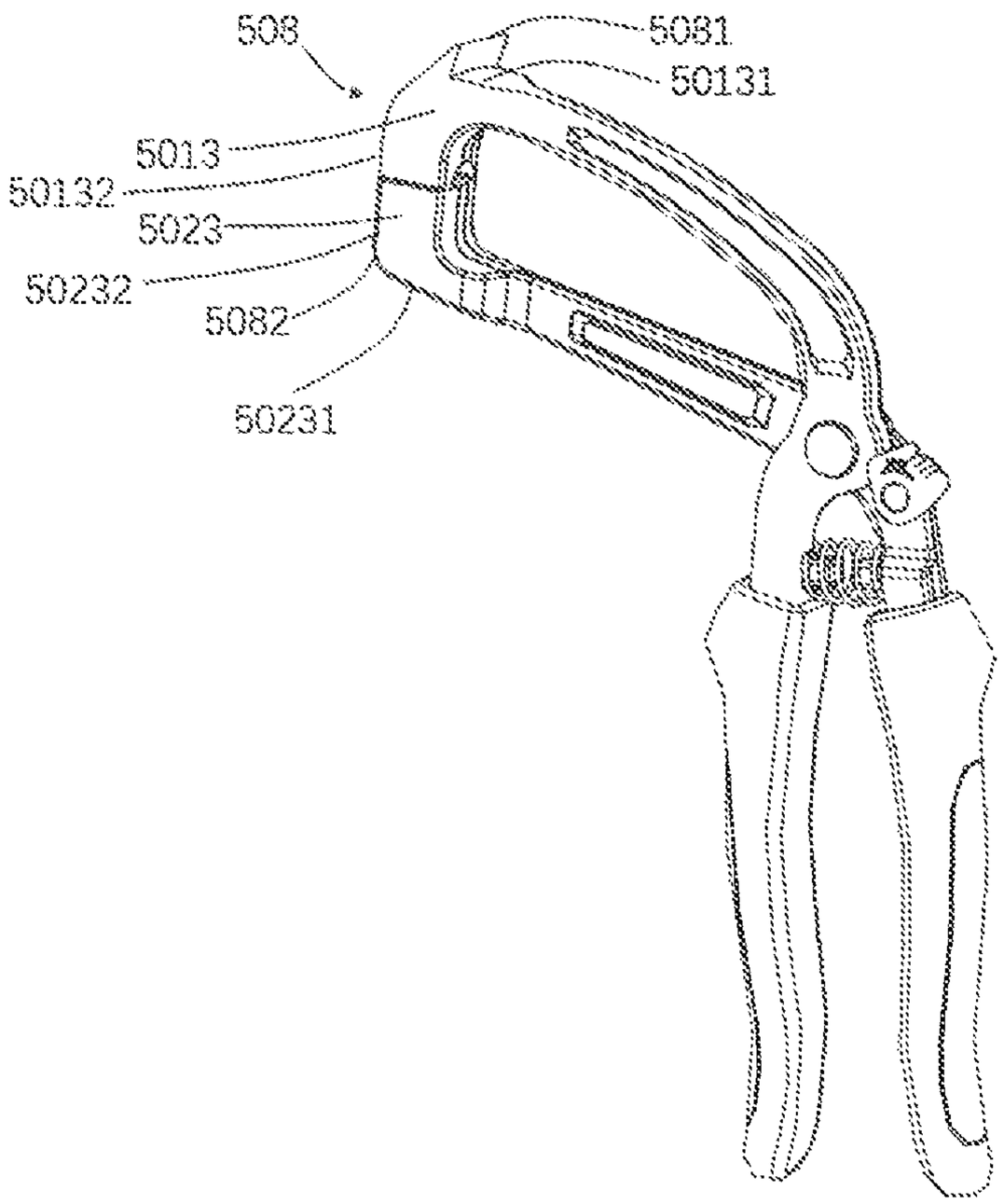
508
5081
50131
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Fig. 45

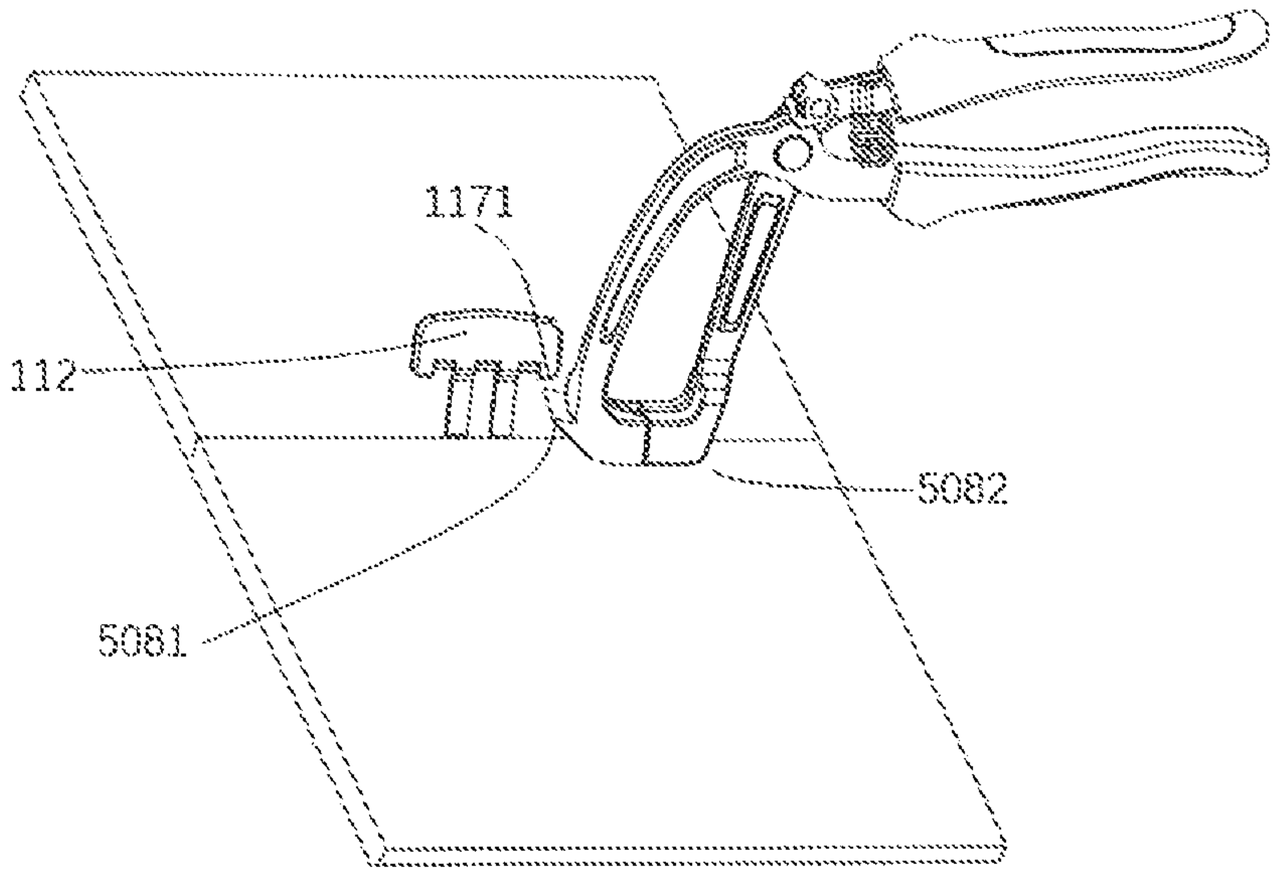

Fig. 46

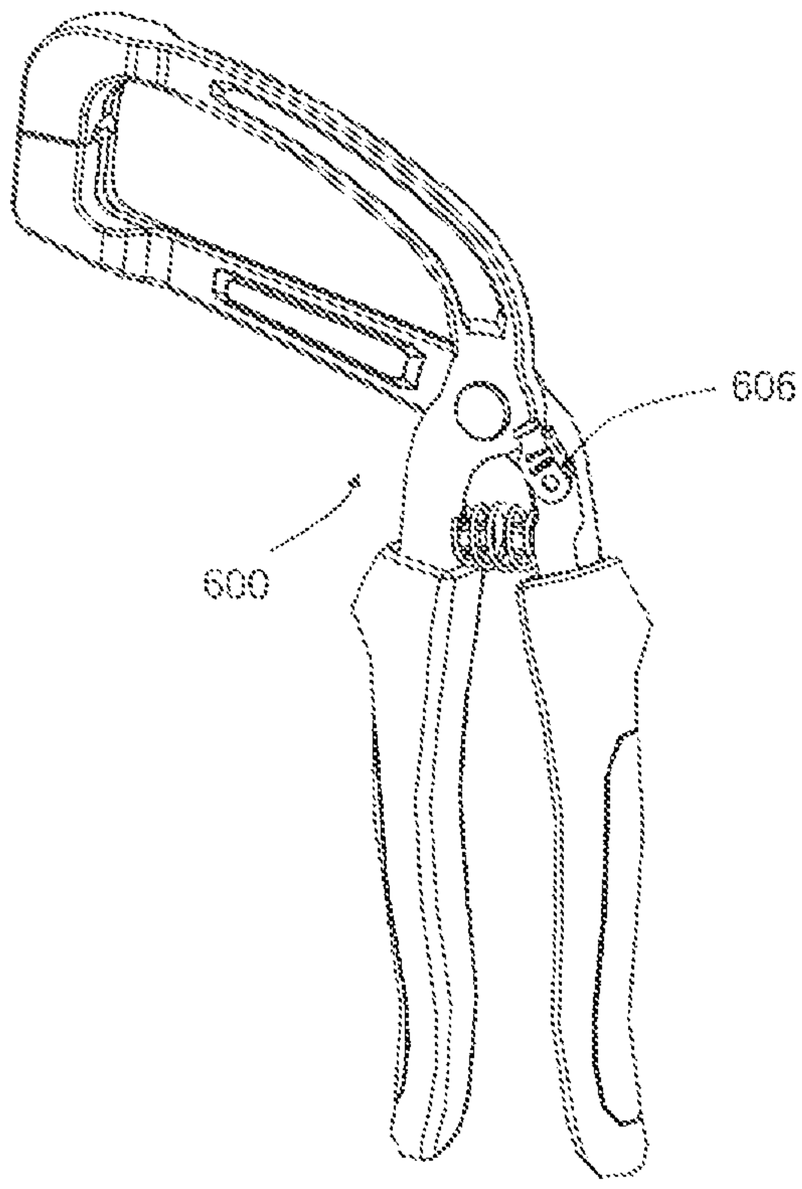

Fig. 47

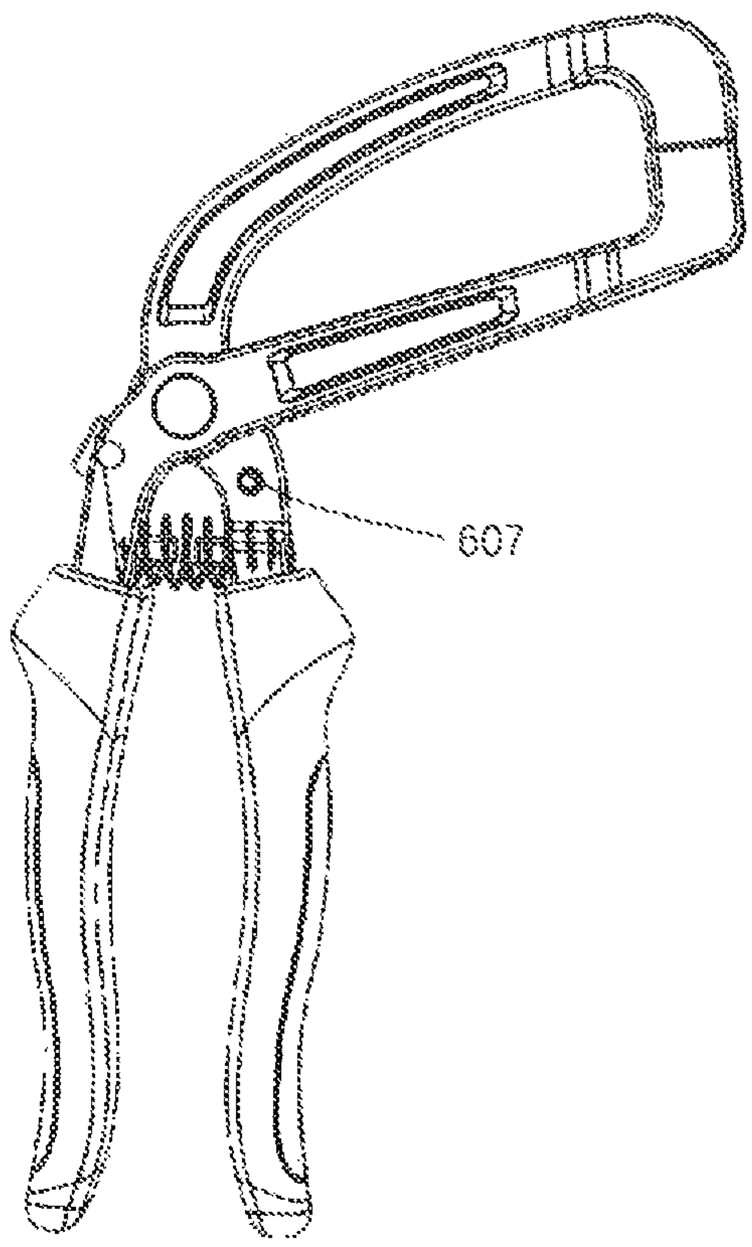

Fig. 48

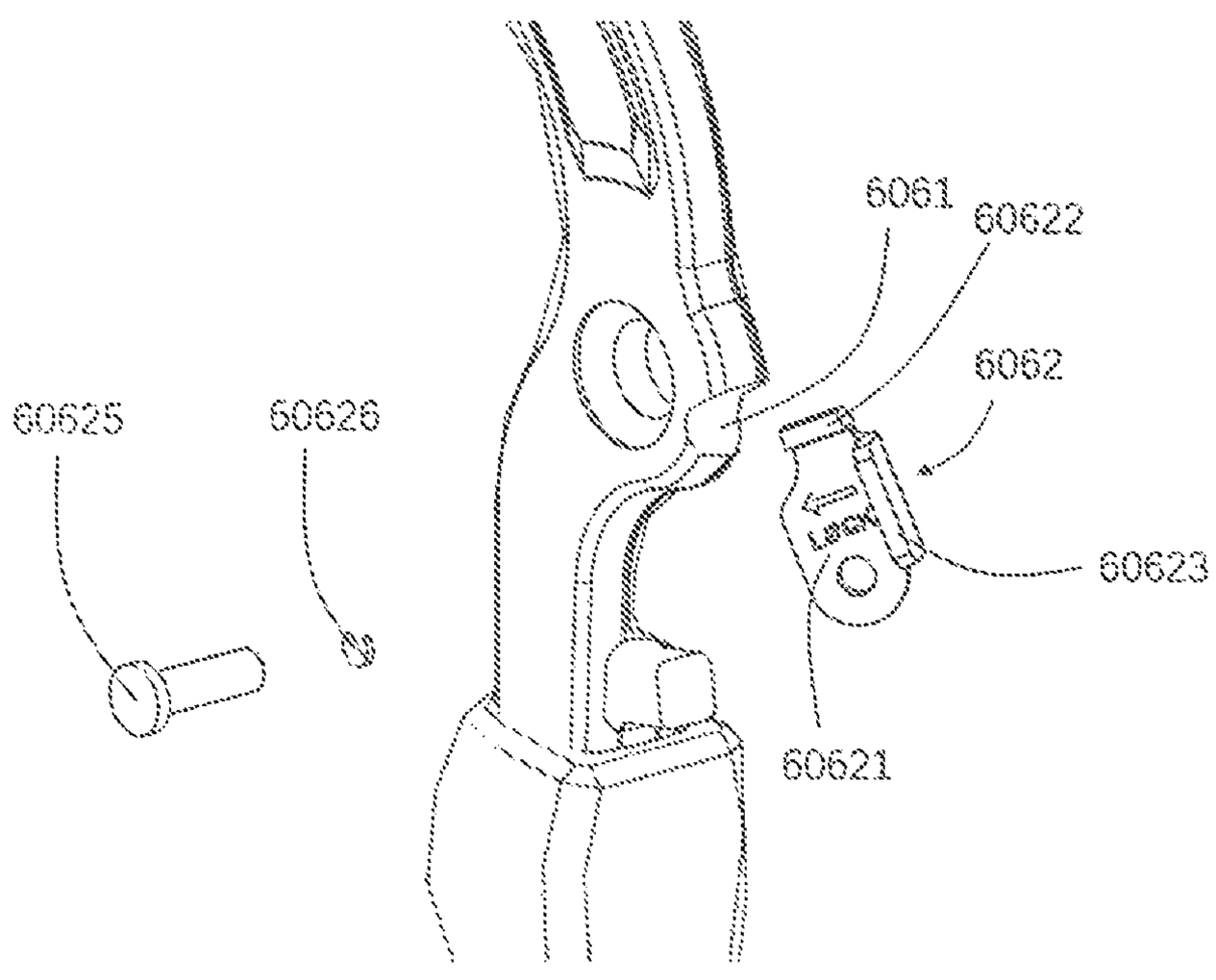

Fig. 49

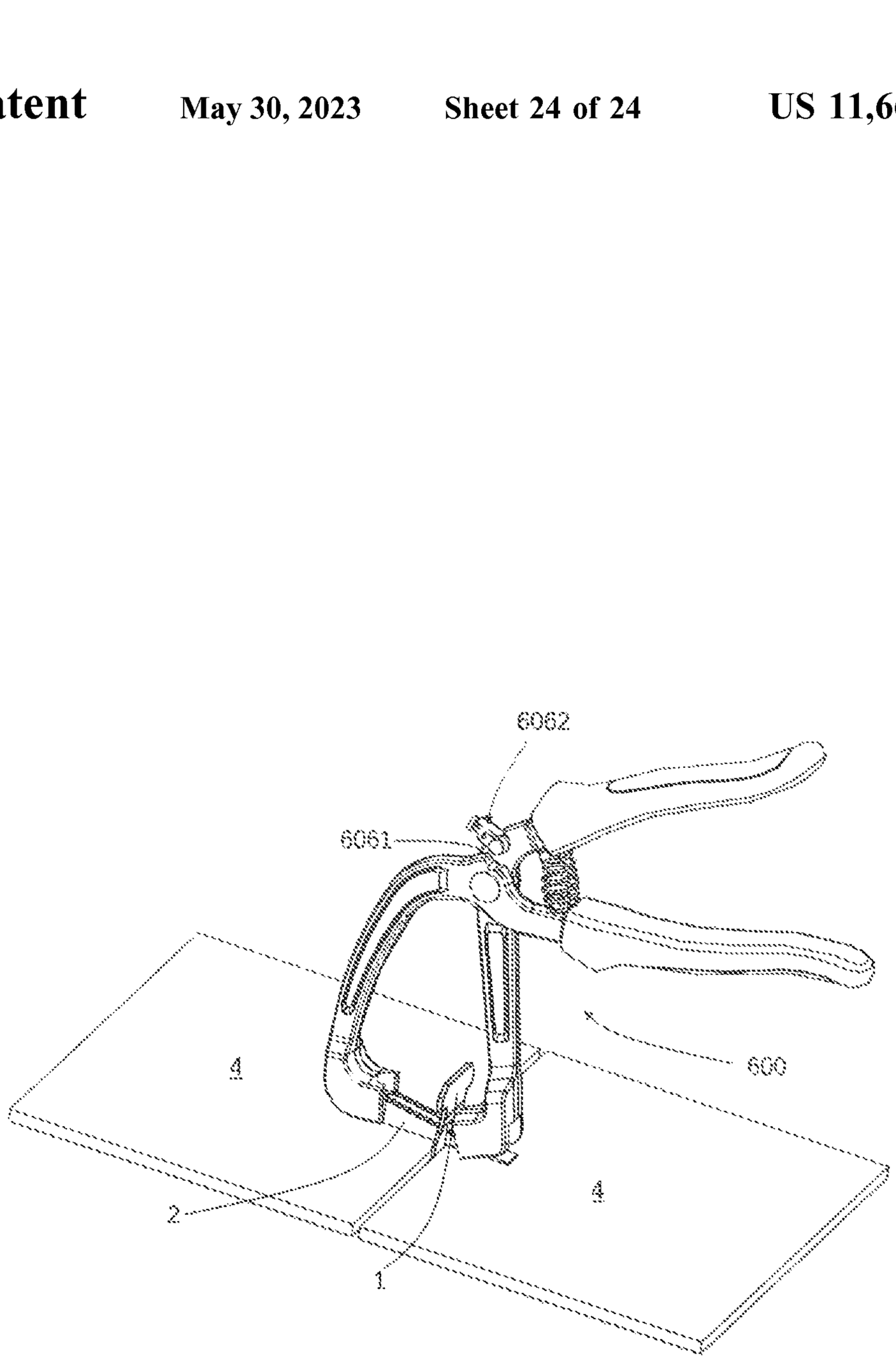

Fig. 50

CERAMIC TILE LEVELING BRACKET, PUSHING AND CLAMPING PLIERS, AND CERAMIC TILE LEVELING AND LAYING SYSTEM

The present application is a continuation application of the earlier U.S. patent application Ser. No. 16/470,512 filed on 17 Jun. 2019, the U.S. patent application Ser. No. 16/470,512 being under examination, and is the PCT application of the international application No. PCT/CN2017/096189 filed on 7 Aug. 2017 for national phase conversion based on 35 U.S.C. § 371. The PCT application is published in Chinese. The all contents of each of the applications are incorporated by reference herein.

FIELD OF THE INVENTION

The present application relates to a ceramic tile laying tool, and in particular to a ceramic tile leveling bracket, pushing and clamping pliers, and a ceramic tile leveling and laying system.

DESCRIPTION OF THE PRIOR ART

Ceramic tile inlaying processes often used in the building decoration industry mainly use the traditional manual paving method. The common method for paving floor ceramic tiles is generally divided into a dry laying method and a wet laying method.

The wet laying method uses cement mortar or the like as an adhesive to directly paste the ceramic tile to a wall or a floor. The shortcomings lie in that the flatness and fullness of the paved ceramic tile are relatively poor, and the viscosity thereof is also poor, such that it can only be applied to the pasting of small ceramic tiles, and has a large limitation; and, the workload in the pasting process is relatively large, the technical requirements for the construction personnel are high, and the construction efficiency is low.

The dry laying method directly lays ceramic tiles of a larger size and area, such as floor tiles, on a flat and dried floor. The shortcomings lie in that the thickness of the required laying materials is relatively great, the requirements for the floor flatness are higher, it is necessary to use a sufficient amount of cement to level the entire floor, which requires a high technical level for the construction personnel and the phenomenon of waste of materials is more serious, and if the flatness is not enough, it is easy to produce a hollowing phenomenon, which affects the quality of the laying; and it is necessary to wait for the cement to solidify and dry before starting laying of ceramic tiles and also tamp the ceramic tiles with a rubber hammer after laying, such that the process is complicated, the workload is large, the laying speed is slow, and the construction efficiency is low.

There is a need in the market for a device capable of assist in ceramic tile laying, which can quickly achieve ceramic tile leveling and improve the construction efficiency.

SUMMARY OF THE INVENTION

An object of the present application is to provide a ceramic tile leveling and laying device, which solves the problems of the prior art, such as complicated leveling and laying processes, low laying efficiency, and high technical requirements for operators.

In order to solve the above technical problems, the present application provides a ceramic tile leveling and laying system, comprising: a ceramic tile leveling bracket disposed at the junction of two adjacent ceramic tiles; an insertion block, with one end thereof being inserted into an insertion block through-hole of the ceramic tile leveling bracket; and a pair of pushing and clamping pliers used to push and clamp the insertion block into the insertion block through-hole such that a bottom face of the insertion block is tangent to upper surfaces of the two ceramic tiles.

In order to solve the above technical problems, the present application further provides a ceramic tile leveling bracket, comprising: a pad used to support bottom faces of two adjacent ceramic tiles; an insert protruding from the middle line of an upper surface of the pad and used to be inserted into a gap between the two adjacent ceramic tiles; and a breakable connecting portion located at a lower portion of the insert and close to the pad; wherein the insert comprises: an insertion block through-hole which penetrates the insert and into which an insertion block is inserted; and/or a bayonet disposed at a lateral side of the insert on one or both sides, with the height of the bayonet being greater than the height of the sheet.

Further, in various embodiments, the insert further comprises a hook-shaped engagement block disposed at a lateral side of the insert on one or both sides and protruding toward the bayonet; wherein the bottom of the bayonet is arc-shaped, and a portion, close to the hook-shaped engagement block, of the bayonet forms a hook-shaped bayonet portion.

Further, in various embodiments, the insert comprises a linear groove downwardly recessed from a surface of the insert on one or both sides, with the bottom of the linear groove being the connecting portion.

Further, in various embodiments, a bottom face of the pad is an arc-shaped surface and is part of a cylindrical side face; and two ends of the pad extend upward from the middle of the bottom face to make contact with the bottom faces of the ceramic tiles.

Further, in various embodiments, the pad comprises: reinforcing ribs disposed at the tops of the two ends of the pad; and/or a pad through-hole penetrating the pad.

Further, in various embodiments, the longitudinal cross-section of the insertion block is wedge-shaped and comprises: an insertion block bottom face, which is a flat surface; an insertion block top face, which is an inclined flat surface and forms an acute angle with the insertion block bottom face; and two or more serrations protruding from the insertion block top face and arranged in the same straight line, wherein each of the serration comprises a vertical serration face and an inclined serration face, and the vertical serration face is perpendicular to the insertion block bottom face.

In order to solve the technical problem of inserting and clamping the insertion block into the insertion block through-hole, the present application further provides pushing and clamping pliers, comprising: a first component comprising a first clamping portion and a first handheld portion; a second component comprising a second clamping portion and a second handheld portion; and a pivot via which the second clamping portion is rotatably connected to the first clamping portion; a first clamping block disposed at a top end of the first clamping portion; a second clamping block disposed at a top end of the second clamping portion and disposed opposite the first clamping block; a first groove downwardly recessed from an inner side wall of the first clamping block, with the direction of opening of the clamping groove facing the second clamping block; and a second groove penetrating the second clamping block and disposed opposite the clamping groove.

Further, in various embodiments, the pushing and clamping pliers further comprise a pulling device used to break the sheet of the ceramic tile leveling bracket to remove the portion, above the sheet, of the insert.

Further, in various embodiments, the pulling device comprises: a hooked corner portion protruding in a barbed shape from an outer side wall of the first clamping block; and a rounded corner portion disposed at the junction of a side wall and the top of the second clamping block; or the pulling device comprises: a hooked corner portion protruding in a barbed shape from an outer side wall of the second clamping block; and a rounded corner portion disposed at the junction of a side wall and the top of the first clamping block.

Further, in various embodiments, the pushing and clamping pliers further comprise: clamping teeth disposed at an inner side face of the first clamping block and disposed opposite the second clamping block; and/or disposed at an inner side face of the second clamping block and disposed opposite the first clamping block.

Further, in various embodiments, the pushing and clamping pliers further comprise an elastic member, with one end thereof being connected to the first clamping portion and the other end thereof being connected to the second clamping portion, or with one end thereof being connected to the first handheld portion and the other end thereof being connected to the second handheld portion.

Further, in various embodiments, the pushing and clamping pliers further comprise: a first guiding post protruding from a side face of the first clamping portion; and a second guiding post protruding from a side face of the second clamping portion and disposed opposite the first guiding post; wherein the elastic member is a coil spring, with one end thereof being sheathed over the first guiding post, and the other end thereof being sheathed over the second guiding post.

Further, in various embodiments, the pushing and clamping pliers further comprise: a first guiding post protruding from a side face of the first handheld portion; and a second guiding post protruding from a side face of the second handheld portion and disposed opposite the first guiding post; wherein the elastic member is a coil spring, with one end thereof being sheathed over the first guiding post, and the other end thereof being sheathed over the second guiding post.

Further, in various embodiments, the pushing and clamping pliers further comprise a locking device used to switch the pushing and clamping pliers between opened and closed states; when the locking device is locked, the elastic force of the elastic member is overcome, so that the pushing and clamping pliers are in a closed state; and when the locking device is unlocked, the pushing and clamping pliers are in an opened state under the action of the elastic force of the elastic member.

Further, in various embodiments, the pushing and clamping pliers further comprise: a first bent portion, which is part of the first clamping portion and is sheathed outside the pivot; and a second bent portion, which is part of the second clamping portion and is sheathed outside the pivot.

Further, in various embodiments, the locking device comprises: a locking slot disposed at an outer side wall of the first bent portion; a locking member rotatably fitted to a surface of the end of the second clamping portion and disposed opposite the locking slot; and a blocking block disposed at a surface of the end of the first clamping portion and disposed opposite the second bent portion, wherein when the pushing and clamping pliers have the maximum opening angle, the blocking block comes into contact with an outer side wall of the second bent portion.

Further, in various embodiments, the locking device comprises: a locking slot disposed at an outer side wall of the second bent portion; a locking member rotatably fitted to a surface of the end of the first clamping portion and disposed opposite the locking slot; and a blocking block disposed at a surface of the end of the second clamping portion and disposed opposite the first bent portion, wherein when the pushing and clamping pliers have the maximum opening angle, the blocking block comes into contact with an outer side wall of the first bent portion.

Further, in various embodiments, the locking member comprises: a locking member body rotatably connected to the end of the first clamping portion or the second clamping portion via a second pivot; a locking engagement block protruding from a surface of the locking member body; and a tab protruding from the surface of the locking member body to drive the locking member body to rotate.

Further, in various embodiments, the locking device is locked when the locking engagement block is engaged into the locking slot; and the locking device is unlocked when the locking engagement block is disengaged from the locking slot.

Another object of the present application is to provide a ceramic tile leveling and laying device that can be applied when at least two adjacent ceramic tiles are laid, which can improve the efficiency while saving the user's physical strength.

In order to solve the above technical problems, the present application provides a ceramic tile leveling and laying system, comprising:

a ceramic tile leveling bracket configured to be able to be disposed at the junction of at least two adjacent ceramic tiles;

an insertion block, configured to be inserted into the ceramic tile leveling bracket; and

a pair of pushing and clamping pliers, which is used to push and clamp the insertion block into the ceramic tile leveling bracket such that a bottom face of the insertion block is tangent to upper surfaces of the at least two adjacent ceramic tiles;

wherein the ceramic tile leveling bracket comprises:

a pad, with an upper surface of the pad being configured to be able to come into contact with lower surfaces of the at least two adjacent ceramic tiles to support the ceramic tiles;

an insert provided on the upper surface of the pad and configured to pass through a gap between the adjacent the ceramic tiles; the insert comprises at least one insertion block receiving portion used to receive the insertion block; and

a connecting portion provided on the insert and configured to break under an action of an external force so that at least part of the insert is separated from the pad;

wherein the insertion block is wedge-shaped and has a first end and a second end lower than the first second, and a bottom surface of the insertion block in contact with the ceramic tile is a flat surface; the insertion block comprising a protrusion and at least one serration portion, wherein the serration portion comprising: a serration portion top face, which is an inclined surface relative to the bottom surface of the insertion block and forms an acute angle with the bottom surface of the insertion block; and at least two serrations protruding from a top face of the serration portion; and wherein the protrusion is located on the first end of the insertion block;

wherein the pushing and clamping pliers comprises:

a first component comprising a first clamping portion and a first handheld portion;

a second component comprising a second clamping portion and a second handheld portion;

a pivot via which the second clamping portion is rotatably connected to the first clamping portion;

a first clamping block disposed at a top end, away from the first handheld portion, of the first clamping portion;

a second clamping block disposed at a top end, away from the second handheld portion, of the second clamping portion;

a first groove inwardly recessed from an inner side wall of the first clamping block, with the direction of opening of the clamping groove facing the second clamping portion; and

a second groove, which penetrates the second clamping block toward the first clamping block and is disposed opposite the first groove;

the first groove and the second groove being configured to hold the insertion block when the pushing and clamping pliers push the insertion block into the ceramic tile leveling bracket;

wherein the first clamping portion extends and bends from the first handheld portion, the second clamping portion extends and bends from the second handheld portion, and the first clamping portion and the second clamping portion bend in the same direction.

Further, the ceramic tile leveling bracket further comprises a rib that is provided on the upper surface of the pad and is separated from the insert, and a projection of the rib on the upper surface of the pad forms an angle with a projection of the insert on the upper surface of the pad; and the bottom surface of the insertion block is provided with a strip groove.

The ceramic tile leveling bracket can be used for laying three or four ceramic tiles at the same time by setting the rib. Specifically, the ceramic tile leveling bracket is arranged in the adjacency of three or four ceramic tiles, so that the rib is located between two of the ceramic tiles, and the work efficiency can be improved. The groove provided on the bottom surface of the insertion block can be matched with the rib, so that when the insertion block is inserted into the insert, the bottom surface of the insertion block is tangent to the upper surface of the ceramic tiles, and will not be affected by the rib.

In order to solve the above problems, the present application further provides a ceramic tile leveling bracket, comprising:

a pad, with an upper surface of the pad being configured to be able to come into contact with lower surfaces of at least two adjacent ceramic tiles to support the ceramic tiles;

an insert provided on the upper surface of the pad and configured to pass through a gap between the adjacent the ceramic tiles; and

a connecting portion provided on the insert and configured to break under an action of an external force so that at least part of the insert is separated from the pad; wherein the insert comprises:

at least one insertion block receiving portion used to receive an insertion block.

Further, in various embodiments, the insertion block receiving portion comprises: a first insertion block receiving portion provided in the insert; and/or

a second insertion block receiving portion provided on at least one side of the insert in the lengthwise direction of the insert.

Further, in various embodiments, a thickness of the connecting portion is less than a thickness of the insert so as to form a linear groove in the insert.

Further, in various embodiments, the ceramic tile leveling bracket further comprises a rib that is provided on the upper surface of the pad and is separated from the insert, and a projection of the rib on the upper surface of the pad forms an angle with a projection of the insert on the upper surface of the pad.

Further, in various embodiments, the rib is located between an outer edge of the pad and the insert, the insert having a first surface and a second surface, the first surface referring to a surface of the insert facing the rib, the second surface referring to a surface of the insert opposite to the first surface, a first end of the rib not exceeding the outer edge of the pad, and a second end of the rib not exceeding the second surface of the insert.

Further, in various embodiments, the first end of the rib does not exceed a first outer edge of the pad, and the second end of the rib does not exceed a second outer edge, opposite the first outer edge, of the pad.

Further, in various embodiments, the pad comprises at least one pad groove that penetrates the pad in the thickness direction of the pad, and the pad groove is disposed on a lateral side, facing the ceramic tile, of the pad.

Further, in various embodiments, the insertion block is wedge-shaped and has a first end and a second end lower than the first second, and a bottom surface of the insertion block in contact with the ceramic tile is a flat surface; the insertion block comprising a protrusion and at least one serration portion wherein the serration portion comprising:

a serration portion top face, which is an inclined surface relative to the bottom surface of the insertion block and forms an acute angle with the bottom surface of the insertion block;

at least two serrations protruding from a top face of the serration portion;

wherein the protrusion is located on the first end of the insertion block.

Further, in various embodiments, the bottom surface of the insertion block is provided with a strip groove.

In order to solve the above problems, the present application further provides pushing and clamping pliers used to push an insertion block into a ceramic tile leveling bracket, the pushing and clamping pliers comprising:

a first component comprising a first clamping portion and a first handheld portion;

a second component comprising a second clamping portion and a second handheld portion;

a pivot via which the second clamping portion is rotatably connected to the first clamping portion;

a first clamping block disposed at a top end, away from the first handheld portion, of the first clamping portion;

a second clamping block disposed at a top end, away from the second handheld portion, of the second clamping portion;

a first groove inwardly recessed from an inner side wall of the first clamping block, with the direction of opening of the clamping groove facing the second clamping portion; and

a second groove, which penetrates the second clamping block toward the first clamping block and is disposed opposite the first groove;

the first groove and the second groove being configured to hold the insertion block when the pushing and clamping pliers push the insertion block into the ceramic tile leveling bracket;

wherein the first clamping portion extends and bends from the first handheld portion, the second clamping portion extends and bends from the second handheld portion, and the first clamping portion and the second clamping portion bend in the same direction.

Further, in various embodiments, the included angle between the first clamping portion and the first handheld portion is an obtuse angle, and the included angle between the second clamping portion and the second handheld portion is an obtuse angle.

Further, in various embodiments, the pushing and clamping pliers further comprises an elastic member, one end of the elastic member connected to the first component and another end of the elastic member connected to the second component, the elastic member configured to exert an elastic force to cause the first component and the second component to move in an opening direction.

Further, in various embodiments, the pushing and clamping pliers further comprises:

a first guiding post protruding from a side face, facing to the second component, of the first component;

a second guiding post protruding from the second component and disposed opposite the first guiding post;

wherein the elastic member is a spring with one end of the spring being sheathed over the first guiding post, and another end of the spring being sheathed over the second guiding post.

Further, in various embodiments, the pushing and clamping pliers further comprise a locking device configured to overcome the elastic force of the elastic member when the locking device is locked, so that the first component and the second component are in a closed state.

Further, in various embodiments, further comprising:

a first bent portion, which is part of the first clamping portion and is sheathed outside the pivot; and

a second bent portion, which is part of the second clamping portion and is sheathed outside the pivot;

the locking device comprises:

a locking slot disposed on the first clamping portion and located away from an outer side wall of the first bent portion of the first clamping portion;

a locking member rotatably connected to the second clamping portion and disposed opposite the locking slot; and

a blocking block disposed on the first clamping portion and disposed opposite the second bent portion of the second clamping portion, the blocking block being configured such that when the pushing and clamping pliers have the maximum opening angle, the blocking block comes into contact with the second bent portion of the second clamping portion.

Further, in various embodiments, the locking member comprises:

a locking member body rotatably connected to the second clamping portion via a second pivot;

a locking engagement block protruding from a surface of the locking member body to cooperate with the locking slot; and

a tab protruding from the surface of the locking member body to drive the locking member body to rotate.

Further, in various embodiments, the locking member comprises:

a locking member body rotatably connected to the second clamping portion via a second pivot;

a locking engagement block, which has an obtuse angle and is located at a surface of the locking member body to cooperate with the locking slot;

a limiting block formed by the surface of the locking member body protruding outward, with a side wall of the limiting block being bent; and

a toggle portion used to move the locking member body; the toggle portion being disposed at the surface of the locking member body, a side wall of the toggle portion being inwardly recessed from the surface of the locking member body, and the side wall of the toggle portion being provided with a toothed pattern.

Further, in various embodiments, further comprising: a pulling device that comprises a hooked corner portion and a rounded corner portion, the hooked corner portion being in a barbed shape; wherein the hooked corner portion is disposed at one of the first clamping block and the second clamping block, and the rounded corner portion is disposed at the other of the first clamping block and the second clamping block.

Further, in various embodiments, further comprising clamping teeth, wherein the clamping teeth are disposed on a side face, facing the second clamping block, of the first clamping block, and/or

the clamping teeth are disposed on a side face, facing the first clamping block, of the second clamping block.

The present application has the advantages that, by providing a ceramic tile leveling bracket, pushing and clamping pliers and a ceramic tile leveling and laying system, in the ceramic tile laying process, the ceramic tile leveling bracket and the insertion block are used to support the junction of the at least two adjacent ceramic tiles, such that the upper surfaces of multiple ceramic tiles in the same area are kept in the same plane, the operation is simple and convenient, and the laying efficiency and the leveling quality are effectively improved, thereby facilitating large-scale application.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic structural diagram of a ceramic tile leveling and laying system in a use state according to Embodiment 1 of the present application;

FIG. **2** is a schematic perspective structural diagram of the ceramic tile leveling bracket according to Embodiment 1 of the present application;

FIG. **3** is a schematic diagram of the longitudinal cross-section of the ceramic tile leveling bracket according to Embodiment 1 of the present application;

FIG. **4** is a schematic front structural diagram of the ceramic tile leveling bracket according to Embodiment 1 of the present application;

FIG. **5** is a schematic cross-sectional structural diagram of an insertion block and an insertion block through-hole according to Embodiment 1 of the present application;

FIG. **6** is a schematic structural diagram of pushing and clamping pliers according to Embodiment 1 of the present application;

FIG. **7** is a schematic exploded structural diagram of the pushing and clamping pliers according to Embodiment 1 of the present application;

FIG. **8** is a schematic side structural diagram of a locking device according to Embodiment 1 of the present application;

FIG. **9** is a side view of the ceramic tile leveling and laying system in a use state according to Embodiment 1 of the present application;

FIG. **10** is a schematic diagram of the removal of an insert with the pushing and clamping pliers according to Embodiment 1 of the present application;

FIG. **11** is a schematic structural diagram of a ceramic tile leveling and laying system in a use state according to Embodiment 2 of the present application;

FIG. **12** is a schematic perspective structural diagram of a second ceramic tile leveling bracket according to Embodiment 2 of the present application;

FIG. **13** is a front view of the second ceramic tile leveling bracket according to Embodiment 2 of the present application;

FIG. **14** is a schematic structural diagram of the second ceramic tile leveling bracket according to Embodiment 2 of the present application from another perspective;

FIG. **15** is a schematic enlarged diagram of a second sheet according to Embodiment 2 of the present application;

FIG. **16** is a schematic enlarged diagram of the second sheet in use according to Embodiment 2 of the present application;

FIG. **17** is a schematic structural diagram of a second insertion block according to Embodiment 2 of the present application;

FIG. **18** is a schematic structural diagram of a bottom structure of the second insertion block according to Embodiment 2 of the present application;

FIG. **19** is a schematic longitudinal structural diagram of the second insertion block according to Embodiment 2 of the present application;

FIG. **20** is a schematic structural diagram of the second insertion block and the second ceramic tile leveling bracket in a use state according to Embodiment 2 of the present application;

FIG. **21** is a schematic enlarged diagram of the second insertion block and the second ceramic tile leveling bracket in a use state according to Embodiment 2 of the present application;

FIG. **22** is a schematic perspective structural diagram of a third ceramic tile leveling bracket according to Embodiment 3 of the present application;

FIG. **23** is a top view of the third ceramic tile leveling bracket according to Embodiment 3 of the present application;

FIG. **24** is a schematic structural diagram of the third ceramic tile leveling bracket in use according to Embodiment 3 of the present application;

FIG. **25** is a schematic structural diagram of a bottom structure of the third insertion block according to Embodiment 3 of the present application;

FIG. **26** is a schematic structural diagram of the third ceramic tile leveling bracket and an insertion block in a use state according to Embodiment 3 of the present application;

FIG. **27** is a schematic perspective structural diagram of a fourth ceramic tile leveling bracket according to Embodiment 4 of the present application;

FIG. **28** is a top view of the fourth ceramic tile leveling bracket according to Embodiment 4 of the present application;

FIG. **29** is a schematic structural diagram of fourth ceramic tile leveling bracket in use according to Embodiment 4 of the present application;

FIG. **30** is a schematic structural diagram of the fourth ceramic tile leveling bracket and an insertion block in a use state according to Embodiment 4 of the present application;

FIG. **31** is a schematic perspective structural diagram of a fifth ceramic tile leveling bracket according to Embodiment 5 of the present application;

FIG. **32** is a top view of the fifth ceramic tile leveling bracket according to Embodiment 5 of the present application;

FIG. **33** is a schematic structural diagram of the fifth ceramic tile leveling bracket in a use state according to Embodiment 5 of the present application;

FIG. **34** is a schematic perspective structural diagram of a sixth ceramic tile leveling bracket according to Embodiment 6 of the present application;

FIG. **35** is a top view of the sixth ceramic tile leveling bracket according to Embodiment 6 of the present application;

FIG. **36** is a schematic structural diagram of the sixth ceramic tile leveling bracket in a use state according to Embodiment 6 of the present application;

FIG. **37** is a schematic structural diagram of second pushing and clamping pliers according to Embodiment 7 of the present application;

FIG. **38** is a schematic structural diagram of the second pushing and clamping pliers according to Embodiment 7 of the present application from another perspective;

FIG. **39** is a schematic exploded diagram of the second pushing and clamping pliers according to Embodiment 7 of the present application;

FIG. **40** is a schematic structural diagram of a second locking member body according to Embodiment 7 of the present application;

FIG. **41** is a schematic cross-sectional diagram of a second locking device according to Embodiment 7 of the present application;

FIG. **42** is a schematic enlarged diagram of the second locking device after being mounted according to Embodiment 7 of the present application;

FIG. **43** is a rear view of the second pushing and clamping pliers according to Embodiment 7 of the present application;

FIG. **44** is a schematic structural diagram of the second pushing and clamping pliers in a use state according to Embodiment 7 of the present application;

FIG. **45** is a schematic structural diagram of a second pulling device according to Embodiment 7 of the present application;

FIG. **46** is a schematic structural diagram of the second pulling device in a use state according to Embodiment 7 of the present application;

FIG. **47** is a schematic structural diagram of third pushing and clamping pliers according to Embodiment 8 of the present application;

FIG. **48** is a rear view of the third pushing and clamping pliers according to Embodiment 8 of the present application;

FIG. **49** is a schematic exploded diagram of a third locking device according to Embodiment 8 of the present application; and

FIG. **50** is a schematic structural diagram of the third pushing and clamping pliers in a use state according to Embodiment 8 of the present application.

Parts are labeled in the figures as follows:

1 Ceramic tile leveling bracket, **2** Insertion block, **3** Pushing and clamping pliers, **4** Ceramic tile, **41** Side of ceramic tile, **42** Lower surface of ceramic tile, **43** Gap;

11 Pad, **12** Insert, **13** First connecting portion, **14** Reinforcing rib, **15** Pad through-hole, **16** Insertion block through-hole;

17 Linear groove, **18** Bayonet, **19** Hook-shaped engagement block, **20** Hook-shaped bayonet portion;

210 Serration portion, **21** Serration portion bottom face, **22** Serration portion top face,

23 Serration, **24** Vertical serration face, **25** Inclined serration face;

2101 First end, **2102** Second end, **2103** Protrusion, **31** First component, **32** Second component, **33** Pivot, **34** Clamping teeth, **35** Pulling device, **36** Elastic member;

37 Locking device;

311 First clamping portion, **312** First handheld portion, **313** First clamping block, **314** First groove, **315** First bent portion;

321 Second clamping portion, **322** Second handheld portion, **323** Second clamping block, **324** Second groove, **325** Second bent portion;

351 Hooked corner portion, **352** Rounded corner portion, **361** First guiding post, **362** Second guiding post;

371 Locking slot, **372** Locking member, **373** Blocking block;

3721 Locking member body, **3722** Locking engagement block, **3723** Tab, **3724** Second pivot, **3725** Gasket;

101 Second ceramic tile leveling bracket, **102** Second insertion block;

111 Second pad, **1111** Upper surface of second pad, **1112** First middle line of second pad, **1113** Bottom face of second pad, **1114** Lateral side of second pad, **1115** Pad groove;

112 Second insert, **113** Second connecting portion, **114** Second linear groove, **115** Extension end, **116** First insertion block receiving portion, **117** Limiting portion, **1121** First connection piece, **1122** Second connection piece, **118** Second insertion block receiving portion, **1161** Upper edge of first insertion block receiving portion, **1171** Lower edge of limiting portion, **1181** Upper edge of second insertion block receiving portion, **1120** Insertion block receiving portion;

120 Second serration portion, **121** Bottom face of second insertion block, **122** Serration portion top face, **123** Serration, **124** Serration slot, **125** End portion, **126** Base, **1261** First side of base, **1262** Second side of base, **1263** Second protrusion;

201 Third ceramic tile leveling bracket, **202** Third insertion block;

211 Third pad, **2111** Upper surface of third pad, **2112** Second middle line of third pad, **2113** Outer edge of third pad;

212 Third insert, **216** Third insertion block through-hole;

219 First rib, **2191** First end of first rib, **2192** Second end of first rib;

301 Fourth ceramic tile leveling bracket, **302** Fourth insertion block;

311 Fourth pad, **3111** Upper surface of fourth pad, **3112** Third middle line of fourth pad, **3113** First outer edge of fourth pad, **3114** Fourth outer edge of fourth pad;

312 Fourth insert;

319 Second rib, **3191** First end of second rib, **3192** Second end of second rib;

401 Fifth ceramic tile leveling bracket, **411** Fifth pad, **412** Fifth insert, **4111** Upper surface of fifth pad, **419** Third rib;

601 Sixth ceramic tile leveling bracket, **611** Sixth pad, **612** Sixth insert, **6111** Upper surface of sixth pad, **519** Fourth rib, **5191** First portion of fourth rib, **5192** Second portion of fourth rib;

500 Third pushing and clamping pliers, **501** Third component, **502** Fourth component, **503** Third pivot, **504** Second clamping teeth, **505** Second elastic member, **506** Second locking device, **507** Second blocking block, **508** Second pulling device;

5011 Third clamping portion, **5012** Third handheld portion, **5013** Third clamping block, **5014** Third groove, **5015** Third bent portion, **50131** Side wall of third clamping block, **50132** Top of third clamping block;

5021 Fourth clamping portion, **5022** Fourth handheld portion, **5023** Fourth clamping block, **5024** Fourth groove, **5025** Fourth bent portion, **50231** Side wall of fourth clamping block, **50232** Top of fourth clamping block;

5051 Third guiding post, **5052** Fourth guiding post;

5061 Second locking slot, **5062** Second locking member, **50621** Second locking member body, **50622** Second locking engagement block, **50623** Limiting block, **50624** Toggle portion, **50625** Fourth pivot, **50626** Toothed pattern;

5081 Second hooked corner portion, **5082** Second rounded corner portion;

600 Third pushing and clamping pliers, **606** Third locking device, **607** Third blocking block;

6061 Third locking slot, **6062** Third locking member, **60621** Third locking member body, **60622** Third locking engagement block, **60623** Second tab, **60625** Fifth pivot, **60626** Second gasket.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present application are described below with reference to the accompanying drawings, and the present application can be fully introduced to those skilled in the art, such that the technical content thereof will be clearer and is easy to understand. The present application can be embodied in various forms of embodiments, and the scope of protection of the present application is not limited to the embodiments mentioned herein.

In the drawings, the same reference numeral indicates components having the same structure, and similar reference numerals indicate assemblies having similar structures or functions throughout. The size and thickness of each assembly shown in the figures are shown arbitrarily, and the present application does not define the size and thickness of each assembly. In order to make the illustration clearer, the thickness of the component in some places of the figures is appropriately exaggerated.

Orientation terms mentioned in the present application, such as "upper", "lower", "front", "rear", "left", "right", "inner", "outer", "side" etc., are merely orientations in the figures and are only intended to explain and illustrate the present application and are not intended to limit the scope of protection of the present application.

When a certain assembly is described as "on" a further assembly, the assembly can be placed directly on the further assembly; and there may also be an intermediate assembly on which the assembly is placed, and the intermediate assembly placed on the further assembly. When an assembly is described as "mounted to" or "connected to" a further assembly, it can be understood as either "mounted" or "connected" directly, or an assembly being indirectly "mounted to" or "connected to" the further assembly via an intermediate assembly.

Embodiment 1

As shown in FIG. **1**, this embodiment provides a ceramic tile leveling and laying system, comprising a ceramic tile leveling bracket **1**, an insertion block **2** and pushing and clamping pliers **3**, which cooperate with one another to assist in leveling of ceramic tiles **4** in the ceramic tile laying process, such that all the upper surfaces of the ceramic tiles lie in the same plane.

During the construction of the ceramic tile laying, a user can apply an adhesive, such as cement and a ceramic tile

adhesive, onto a floor or a wall according to requirements, and then multiple ceramic tiles are subsequently laid on the floor or the wall. During laying, a ceramic tile leveling bracket **1** is placed at the junction of any two adjacent ceramic tiles **4**, and taking a square ceramic tile as an example, it is necessary to provide a ceramic tile leveling bracket **1** on each of four sides thereof.

As shown in FIGS. **2-4**, the ceramic tile leveling bracket **1** comprises a pad **11** and an insert **12**, which are integrally provided. The insert **12** protrudes from the middle line of the upper surface of the pad **11**. The longitudinal cross-section of the ceramic tile leveling bracket **1** approximates an inverted T-shape. The pad **11** is disposed below two adjacent ceramic tiles **4**, and the insert **12** is inserted into a gap between the two adjacent ceramic tiles **4**.

The bottom face of the pad **11** is an arc-shaped surface and is part of a cylindrical side face. Two ends of the pad **11** smoothly extend upward from the middle of the bottom face, and the tops of the two ends of the pad **11** are provided with reinforcing ribs **14** to make contact with and support the bottom faces of the two adjacent ceramic tiles **4**. The pad **11** is provided with two or more pad through-holes **15** which penetrate the pad **11**. In the ceramic tile leveling process, an adhesive under the ceramic tile **4** will enter from the pad through-holes **15** into the space enclosed by the pad **11** and the lower surfaces of the ceramic tiles **4**. During the curing of the adhesive, the pad **11** and the two ceramic tiles **4** are fixed into one body.

As shown in FIGS. **4-5**, the middle of the insert **12** is provided with an insertion block through-hole **16**, the insertion block through-hole **16** penetrates the insert **12**, and an insertion block **2** may be inserted into the insertion block through-hole. The longitudinal cross-section of the insertion block **2** is wedge-shaped, and has a first end **2101** and a second end **2102** opposite the first end **2101**. The first end **2101** is higher than the second end **2102**, so that the longitudinal section of the insertion block **2** is wedge-shaped. In the embodiment, the insertion block only comprises one serration portion **210**, which comprises a serration portion bottom face **21** and a serration portion top face **22**. Since the insertion block **2** comprises only one serration portion **210**, the serration portion bottom face **21** is the bottom face of the insertion block **2**, and the serration portion top face **22** is the top face of the insertion block **2**. The serration portion bottom face **21** is a flat surface, and the serration portion top face **22** is an inclined face relative to the serration portion bottom face **21**, and the angle between the serration portion bottom face **21** and the serration portion top face **22** is an acute angle, preferably of 20-30 degrees. The serration portion top face **22** is provided with two or more protruding serrations **23**, and the multiple serrations are arranged in the same straight line. Each of the serrations **23** comprises a vertical serration face **24** and an inclined serration face **25**, the vertical serration face **24** is perpendicular to the serration portion bottom face **21**, and the inclined angle of the inclined serration face **25** is consistent with the inclined angle of the serration portion top face **22**.

As shown in FIG. **1**, after the ceramic tile leveling bracket **1** is fitted into the gap between the two adjacent ceramic tiles **4**, the lower second end **2102** of the insertion block **2** can be inserted into the insertion block through-hole **16**, and the transverse cross-section of the higher first end **2101** of the insertion block **2** is semicircular, forming the protrusion **2103** of the insertion block **2**, which is matched with the pushing and clamping pliers **3**. The user can push the insertion block **2** as far as possible into the insertion block through-hole **16** by means of the pushing and clamping pliers **3**, such that the insert **12** can be engaged into the serration gap between two serrations on the serration portion top face **22** so as to lock the positions of the two ceramic tiles **4**. In the process of gradually pushing the insertion block **2** into the insertion block through-hole **16**, the pad **11** moves in a small range relative to the ceramic tiles **4**, and the ceramic tiles **4** are lifted. The heights of the two ceramic tiles **4** are finely adjusted such that the serration portion bottom face **21** is tangent to the upper surfaces of the two ceramic tiles **4**. At this time, the adhesive under the ceramic tiles **4** is not cured and can flow through the pad through-holes **15** into the space enclosed by the pad **11** and the ceramic tiles **4**. After the adhesive is cured, the pad **11** and the ceramic tiles **4** are fixed into one body. Since the serration portion bottom face **21** is a flat surface, the upper surfaces of the two ceramic tiles **4** are necessarily in the same plane, such that the leveling process of the two ceramic tiles can be completed.

In this embodiment, the ceramic tile **4** is rectangular or square, and the junctions between the four sides thereof and the other ceramic tiles can be respectively provided with a ceramic tile leveling bracket **1** according to the above method. In the similar manner, the upper surfaces of all the ceramic tiles laid on the construction site can be positioned in the same plane by means of multiple ceramic tile leveling brackets **1**, and then left to stand for a period of time to cure the adhesive (cement, ceramic tile adhesive, etc.).

As shown in FIGS. **2-3**, the lower portion, close to the pad **11**, of the insert **12** is provided with a breakable first connecting portion **13**, the first connecting portion **13** is a thin sheet and is part of the insert **12** and is in the shape of a straight line having a certain width, and the user can tear the first connecting portion **13** along the straight line to break same such that the insert **12** is divided into upper and lower portions from the tear. The height of the first connecting portion **13** is substantially flush with the lower surface of the ceramic tile **4**.

The insert **12** further comprises a linear groove **17** inwardly recessed from a surface of the insert **12** on one or both sides, and the bottom of the linear groove **17** is the first connecting portion **13**. With the groove structure of the first connecting portion **13** on one or both sides, the first connecting portion **13** is relatively thin, and has a thickness of generally about 1-2 mm. Such groove structure makes the first connecting portion **13** easy to tear. After the adhesive is cured, the user can violently break or tear the upper portion of the insert **12** from the first connecting portion **13** with a conventional plier tool.

As shown in FIG. **4**, in this embodiment, a lateral side of one side of the insert **12** is provided with a bayonet **18**, or lateral sides of two sides of the insert **12** are respectively provided with a bayonet **18**, and the height of the bayonet **18** is greater than that of the first connecting portion **13**. The insert **12** further comprises a hook-shaped engagement block **19** that is disposed at a lateral side of the insert **11** on one or both sides and protrudes toward the bayonet **18**. The longitudinal cross-section of the bottom of the bayonet **18** is arc-shaped, and a portion, close to the hook-shaped engagement block **19**, of the bayonet **18** forms a hook-shaped bayonet portion **20**. The bottom of the bayonet **18** is a contact edge that can cooperate with an outer edge of a hooked corner portion **351** of the pushing and clamping pliers **3**. The longitudinal cross-section of the bottom of the bayonet **18** is arc-shaped, and the opening end of the arc-shaped contact edge (i.e., the hook-shaped engagement block **19**) is bent downward.

The user can remove the upper part of the insert **12** from the first connecting portion **13** by means of a pulling tool such as a small claw hammer. Specifically, the barbed structure of the pulling tool is used to engage into the bayonet **18** to remove the portion, above the first connecting portion **13**, of the insert based on the lever principle. In this embodiment, a pulling device is provided in the pushing and clamping pliers **3**, and the pulling device has a hook-shaped bayonet portion **20** which can be engaged into the bayonet **18** to quickly and efficiently remove part of the insert, as will be described in detail below.

In the construction of ceramic tile laying, after the cement, the ceramic tile adhesive or the like is cured, the inserts **12** of all the ceramic tile leveling brackets **1** are broken from the first connecting portion **13**, and after the upper half of the insert **12** and the insertion block **2** are removed and cleaned, all the gaps between the ceramic tiles are filled and flattened, and the entire process of ceramic tile laying can be completed. The operation is simple, the construction processes can be effectively reduced, and the construction efficiency is improved.

In this embodiment, the pushing and clamping pliers **3** are used to push and clamp the insertion block **2** into the insertion block through-hole **16** such that the serration portion bottom face **21** is tangent to the upper surfaces of the two ceramic tiles **4**.

As shown in FIGS. **6** and **7**, the pushing and clamping pliers **3** comprise a first component **31**, a second component **32**, and a pivot **33**. The first component **31** comprises a first clamping portion **311** and a first handheld portion **312**, and the second component **32** comprises a second clamping portion **321** and a second handheld portion **322**, the second clamping portion **311** being rotatably connected to the first clamping portion **311** via the pivot **33**. A top end of the first clamping portion **311** is provided with a first clamping block **313**, and a top end of the second clamping portion **321** is provided with a second clamping block **323**. The second clamping block **323** is disposed at the same height as and opposite the first clamping block **313**.

The inner side faces opposite each other of the first clamping block **313** and the second clamping block **323** may be provided with clamping teeth **34**. The clamping teeth **34** of the first clamping block **313** are disposed opposite the second clamping block **323**, and the clamping teeth **34** of the second clamping block **323** are disposed opposite the first clamping block **313**. In other words, the clamping teeth **34** of the first clamping block **313** are opposite the clamping teeth **34** of the second clamping block **323**. The inner side faces opposite each other of the two clamping blocks are clamping faces, and the clamping teeth **34** can increase the coefficient of friction between the clamping faces and the surface of the clamped object, thereby preventing the clamped object from slipping out.

As shown in FIGS. **1** and **6-7**, in this embodiment, the inner side wall of the first clamping block **313** is provided with a downwardly recessed first groove **314**, with the direction of opening thereof facing the second clamping block **323**; and the second clamping block **323** is provided with a second groove **324** that transversely penetrates the entire second clamping block **323**, and the second groove **324** is disposed opposite and in the same straight line as the first groove **314**. Portions, on the two sides and at the bottom of the second groove **324**, of the second clamping block **323** form a bifurcated structure comprising two bifurcated portions, the second groove **324** is located between the two bifurcated portions, and the clamping teeth **34** are provided on the clamping faces on the inner sides of the two bifurcated portions.

As shown in FIG. **9**, the second groove **324** and the first groove **314** are configured to clamp the insertion block **2** such that the insertion block **2** is pushed and clamped into the insertion block through-hole **16** of the ceramic tile leveling bracket **1**. When the lower end of the insertion block **2** is pushed into the insertion block through-hole **16**, the user puts the pushing and clamping plier **3** upside down and opens same, and the protrusion **2103** of the higher first end **2101** of the insertion block **2** is placed in the first groove **314**, the lower second end **2102** of the insertion block **2** is placed in the second groove **324**, and then the two handheld portions **312** and **322** are closed by force. During the closing of the pushing and clamping pliers **3**, the first clamping block **313** pushes the higher end of the insertion block **2** into the insertion block through-hole **16**, the bifurcated portion of the second clamping block **323** is pushed against one side of the insert **12**, and the lower second end **2102** of the insertion block **2** slides through the second groove **324** to secure the insertion block **2** in the insertion block through-hole **16**, such that the insert **12** can be engaged onto a certain serration on the serration portion top face **22**, thereby locking the positions of the two ceramic tiles **4**.

In this embodiment, the pushing and clamping pliers **3** further comprise a pulling device **35** for breaking the first connecting portion **13** of the ceramic tile leveling bracket **1** to remove the portion, above the first connecting portion **13**, of the insert **12**.

As shown in FIGS. **6-7**, the pulling device **35** comprises a hooked corner portion **351** and a rounded corner portion **352**. The hooked corner portion **351** protrudes in a barbed shape from the outer side wall of the first clamping block **313**, and the outer edge of the hooked corner portion **351** is a smooth flat surface or an arc-shaped curved surface, and is disposed at the junction of the side wall and the top of the first clamping block **313**. The rounded corner portion **352** is disposed at the junction of the side wall and the top of the second clamping block **323**, and each of the two bifurcated portions has a rounded corner portion **352**. Alternatively, the hooked corner portion **351** protrudes in a barbed shape from the outer side wall of the second clamping block **323**, and the two bifurcated portions protrude outwardly and extend to form a hooked corner portion **351**, and the hooked corner portion **351** has an outer edge that is a smooth flat surface or an arc-shaped curved surface, and is disposed at the junction of the side wall and the top of the second clamping block **323**. The rounded corner portion **352** is provided at the junction of the side wall and the top of the first clamping block **313**.

In this embodiment, the lateral sides of two sides of the insert **12** are respectively provided with a bayonet **18** and a hook-shaped engagement block **19**, the hook-shaped engagement block **19** is disposed at the upper portion of the bayonet **18** and protrudes toward the bayonet **18**, and a portion, close to the hook-shaped engagement block **19**, of the bayonet **18** forms a hook-shaped bayonet portion **20**. The bottom of the bayonet **18** is a contact edge that can cooperate with an outer edge of a hooked corner portion **351** of the pushing and clamping pliers **3**. The longitudinal cross-section of the bottom of the bayonet **18** is arc-shaped, and the opening end of the arc-shaped contact edge (i.e., the hook-shaped engagement block **19**) is bent downward.

In the ceramic tile laying process, after the adhesive is cured, the pad **11** and the ceramic tiles **4** are all fixed by the adhesive, and the user can remove the upper half of the insert

12 by means of the pulling device 35 of the pushing and clamping pliers 3. As shown in FIG. 10, at first, the user needs to close and lock the pushing and clamping pliers 3, the hooked corner portion 351 of the pulling device 35 is engaged into the bayonet 18 on the lateral side of the insert 12, the outer edge of the hooked corner portion 351 slides along the contact edge of the bayonet 18, the hooked corner portion 351 is engaged into the hook-shaped bayonet portion 20, and the rounded corner portion 352 of the pulling device 35 is placed on the upper surfaces of the ceramic tiles 4. Based on the principle of lever, the user can pull the upper half of the insert 12 upward with the rounded corner portion 352 as the fulcrum, and since the lower portion, close to the pad 11, of the insert 12 is provided with the breakable first connecting portion 13, when an upward force is applied to the upper portion of the insert 12, the first connecting portion 13 is torn or broken, such that the portion, above the first connecting portion 13, of the insert 12 is removed. If the first connecting portion 13 is only torn but not completely broken under the force, since both sides of the insert 12 are provided with the bayonets 18, the user can repeat the above operation from the other side until the upper portion of the insert 12 is completely removed.

As shown in FIGS. 6-7, in this embodiment, the pushing and clamping pliers 3 further comprise an elastic member 36, with one end thereof being connected to the first clamping portion 311, and the other end thereof being connected to the second clamping portion 321. Alternatively, one end of the elastic member is connected to the first handheld portion 312, and the other end thereof is connected to the second handheld portion 322. When the first component 31 and the second component 32 of the pushing and clamping pliers 3 are to be relatively closed, the user only needs to use one hand to apply force to the inner side, but when they are to be relatively opened, the user needs to use two hands at the same time, so the operation is inconvenient. With the elastic member 36 mounted between the first component 31 and the second component 32, a certain outward tension can be provided between the first component 31 and the second component 32, such that the user can perform opening and closing operations with one hand.

Preferably, this embodiment further comprises a first guiding post 361 and a second guiding post 362 respectively disposed on two opposite side faces of the two handheld portions 312 and 322. The first guiding post 361 protrudes from the inner side face of the first handheld portion 312. The second guiding post 362 protrudes from the inner side face of the second handheld portion 322, and the second guiding post 362 is disposed opposite the first guiding post 361. The elastic member 36 is preferably a coil spring, with one end thereof being sheathed over the first guiding post 361, and the other end thereof being sheathed over the second guiding post 362. In other variant embodiments, the two guiding posts 361, 362 may be respectively disposed on two opposite side faces of the two clamping portions 311 and 321. The first guiding post 361 protrudes from the inner side face of the first clamping portion 311, the second guiding post 362 protrudes from the inner side face of the second clamping portion 321, and the second guiding post 362 is disposed opposite the first guiding post 361.

As shown in FIGS. 6-8, in this embodiment, the pushing and clamping pliers 3 further comprise a locking device 37 used to switch the pushing and clamping pliers 37 between opened and closed states including a closed state and an opened state. When the locking device 37 is locked, the pushing and clamping pliers 3 are in the closed state. When the locking device 37 is unlocked, the pushing and clamping pliers 3 are in the opened state.

In this embodiment, the pushing and clamping pliers 3 further comprise a first bent portion 315 and a second bent portion 325, which are both sheathed outside the pivot, such that the second component 32 is hinged to the first component 31 via the pivot 33. The first bent portion 315 is part of the first clamping portion 311, and the second bent portion 325 is part of the second clamping portion 321.

As shown in FIGS. 6-10, the locking device 37 comprises a locking slot 371, a locking member 372, and a blocking block 373. The locking member 372 and the blocking block 373 are respectively disposed at the ends of the two clamping portions and close to the handheld portions.

In this embodiment, preferably, the locking slot 371 is disposed at the outer side wall of the first bent portion 315, and the locking member 372 is rotatably fitted to the surface of the end of the second clamping portion 321 and is disposed opposite the locking slot 371. The blocking block 373 is disposed at the surface of the end of the first clamping portion 311 and is disposed opposite the second bent portion 325. When the pushing and clamping pliers have the maximum opening angle, the blocking block 373 comes into contact with the outer side wall of the second bent portion 325.

As shown in FIG. 8, the locking member 372 comprises a locking member body 3721, a locking engagement block 3722, and a tab 3723. The locking member body 3721 may be a metal sheet, and is rotatably connected to the end of the first clamping portion 311 or the second clamping portion 321 via a second pivot 3724. A gasket 3725 is disposed between the locking member 372 and the first clamping portion 311 or the second clamping portion 321. The locking member 372 and the clamping portion 311, 321 are both made of metal, and the gasket 3725 can assist in the relative rotation of the two, thereby reducing wear between the components. The locking engagement block 3722 protrudes from the front end of the surface of the locking member body 3721. When the locking engagement block 3722 is engaged into the locking slot 371, the locking device 37 is locked. When the locking engagement block 3722 is disengaged from the locking slot 371, the locking device 37 is unlocked. The tab 3723 protrudes from and is perpendicular to the surface of the locking member body 3721. The user can move the tab 3723 with a finger to drive the locking member body 3721 to rotate, such that the locking engagement block 3722 is engaged into or disengaged from the locking slot 371.

When the pushing and clamping pliers 3 need to be adjusted from the closed state to the opened state, the user can first further close the two handheld portions, and then rotate the tab 3723 counterclockwise, such that the locking engagement block 3722 is disengaged from the locking slot 371 and is therefore unlocked, and the two clamping portions are opened under the action of the elastic member 36 (coil spring).

When the pushing and clamping pliers 3 need to be adjusted from the opened state to the closed state, the user can first close the two handheld portions, and then rotate the tab 3723 clockwise, such that the locking engagement block 3722 is engaged into the locking slot 371, and the two clamping portions are therefore locked in the closed state.

Similarly, the locking slot 371 may also be disposed on the outer side wall of the second bent portion 325, and the locking member 372 is rotatably fitted to the surface of the end of the first clamping portion 311 and disposed opposite the locking slot 371. The blocking block 373 is disposed on

the surface of the end of the second clamping portion **321** and is disposed opposite the first bent portion **315**. When the pushing and clamping pliers have the maximum opening angle, the blocking block **373** comes into contact with the outer side wall of the first bent portion **315**.

This embodiment provides a ceramic tile leveling bracket, pushing and clamping pliers, and a ceramic tile leveling and laying system. In the ceramic tile laying process, the ceramic tile leveling bracket and the insertion block are used to support the junction of two adjacent ceramic tiles, such that the upper surfaces of multiple ceramic tiles in the same area are kept in the same plane, the operation is simple and convenient, and the laying efficiency and the leveling quality are effectively improved, thereby facilitating large-scale application.

Embodiment 2

As shown in FIG. **11**, this embodiment provides a ceramic tile leveling and laying system, comprising a second ceramic tile leveling bracket **101**, a second insertion block **102**, and pushing and clamping pliers **3**, which cooperate with one another for assist in leveling of ceramic tiles **4** in the ceramic tile laying process, such that all the upper surfaces of the ceramic tiles lie in the same plane.

During the construction of the ceramic tile laying, a user can apply an adhesive, such as cement and a ceramic tile adhesive, onto a floor or a wall according to requirements, and then multiple ceramic tiles are subsequently laid onto the floor or the wall. During laying, a second ceramic tile leveling bracket **101** is placed at the junction of at least two adjacent ceramic tiles **4**, and taking a square ceramic tile as an example, it is necessary to provide a second ceramic tile leveling bracket **101** on each of four sides thereof.

The pushing and clamping pliers **3** used in the present embodiment is the same as that in the embodiment 1.

As shown in FIG. **12**, the second ceramic tile leveling bracket **101** comprises a second pad **111** and a second insert **112**, which are integrally provided. When the second ceramic tile leveling bracket **101** is placed at the junction of at least two adjacent ceramic tiles **4**, the upper surface **1111** of the second pad **111** comes into contact with the lower surfaces **42** of the ceramic tiles **4** (see FIG. **16**) to support the ceramic tiles **4**.

The second insert **112** is disposed on the upper surface **1111** of the second pad **111** and is formed by extends from the upper surface **1111** of the second pad **111** away from the second pad **111**, such that the second insert **112** protrudes from the second pad **111**. Preferably, the second insert **112** is arranged at the first middle line **1112** of the upper surface **1111** of the second pad **111**. The first middle line **1112** refers to a middle line, parallel to the side **41** where the ceramic tiles **4** are adjacent to each other, of the upper surface **1111** of the second pad **111** when the second ceramic tile leveling bracket **101** is placed at the junction of the adjacent ceramic tiles **4**. The longitudinal cross-section of the second ceramic tile leveling bracket **101** (i.e., the cross section parallel to the first middle line **1112**) is approximately in an inverted T-shape (see FIG. **15**). It should be understood that the second insert **112** may not be disposed at the first middle line **1112** of the upper surface **1111** of the second pad **111**. For example, the second insert **112** is arranged at other positions, being parallel to or intersecting with the first middle line **1112**, on the upper surface **1111** of the second pad **111**

When in use, the second pad **111** is disposed below the two adjacent ceramic tiles **4**, and the second insert **112** is inserted into the gap between the two adjacent ceramic tiles **4**.

The second pad **111** is in the shape of a flat plate, that is, the bottom face **1113** and the upper surface **1111** of the second pad **111** are flat surfaces parallel to each other. The side face, connecting the upper surface **1111** and the bottom face **1113**, of the second pad **111** is an inclined surface, and the inclined surface forms an acute angle with the bottom face **1113** of the second pad **111**. The two lateral sides **1114**, facing the ceramic tiles **4**, of the second pad **111** are respectively provided with at least one flow-through portion used to allow the adhesive below the ceramic tiles **4** to enter the space between the upper surface **111** of the second pad **111** and the lower surface of the ceramic tile **4** via the flow-through portion during the leveling of the ceramic tiles, such that the second pad **111** and the ceramic tile **4** are fixed as a whole during curing of the adhesive. Preferably, the two lateral sides **1114**, facing the ceramic tiles **4**, of the second pad **111** are respectively provided with two flow-through portions. In some implementations, the flow-through portion is a pad groove **1115** provided in the lateral side **1114** of the second pad **111**. The pad groove **1115** penetrates the second pad **111** in the thickness direction of the second pad **111**, that is, the pad groove **1115** penetrates from the bottom face **1113** of the second pad **111** to the upper surface **1111** of the second pad **111**, and the pad groove **1115** opens toward the ceramic tile **4**. In some implementations, a through-hole penetrating the bottom face **1113** and the upper surface **1111** of the second pad **111** may be used instead of the pad groove **1115**.

As shown in FIG. **13**, the second insert **112** is used to receive the insertion block, and comprises at least one insertion block receiving portion **1120** which is used to receive the insertion block and into which the insertion block is inserted. Preferably, the insertion block receiving portion **1120** comprises a first insertion block receiving portion **116**, which is a insertion block through-hole provided in the second insert **112**, and/or second insertion block receiving portions **118** provided on at least one side of the second insert **112** in the lengthwise direction thereof. The second insert **112** comprises an extension end **115** away from the second pad **111**. The first connection piece **1121** and the second connection piece **1122** are connected to the extension end **115** and the second pad **111**, the first connection piece **1121** and the second connection piece **1122** are symmetrical about the center line **1123** of the second insert **112**, such that a first insertion block receiving portion **116** located in the middle of the second insert **112** is formed between the first connection piece **1121** and the second connection piece **1122**. The first insertion block receiving portion **116** penetrates the second insert **112** in the thickness direction of the second insert **112**. The first insertion block receiving portion **116** penetrates toward the second pad **111** and reaches the second pad, and can be used to receive insertion of the insertion block, that is, the lateral side, facing the second pad **111**, of the first insertion block receiving portion **116** is flush with the upper surface **1111** of the second pad **111**. The first insertion block receiving portion **116** may also be the same through-hole as the insertion block through-hole **16** in Embodiment 1, that is, the lateral side, facing the second pad **111**, of the second insertion block through-hole **116** is higher than the upper surface **1111** of the second pad **111**.

The second insert **112** further comprises a limiting portion **117**, and the limiting portion **117** is formed by two sides, in the lengthwise direction of the second insert **112**, of the

extension end **115** extending toward the second pad **111** by a certain distance, such that two gaps are formed between the two limiting portions **117** and the corresponding first connection piece **1121** and second connection piece **1122** respectively as the second insertion block receiving portions **118**. The second insertion block receiving portions **118** can also be used to receive the insertion block.

Referring to FIG. **14**, the upper edge **1161** of the first insertion block receiving portion **116** and the upper edge **1181** of the second insertion block receiving portion **118** are provided to be in the shape of an inclined surface, that is, the thickness of the upper edge **1161** of the first insertion block receiving portion **116** and the upper edge **1181** of the second insertion block receiving portion **118** gradually decreases toward the second pad **111**, such that the first insertion block receiving portion **116** and the second insertion block receiving portion **118** cooperates with the insertion block more smoothly.

It should be understood that, in some implementations, the insertion block receiving portion **1120** may only comprise a first insertion block receiving portion **116**; in some implementations, the insertion block receiving portion **1120** may only comprise a second insertion block receiving portion **118**; and in some implementations, the insertion block receiving portion **1120** may comprise a first insertion block receiving portion **116** and a second insertion block receiving portion **118**.

As shown in FIGS. **15** and **16**, the second insert **112** is provided with a second connecting portion **113** close to the second pad **111**. The second connecting portion **113** detachably connects the second insert **112** and the second pad **111**. The second connecting portion **113** is arranged in the second insert **112** and is part of the second insert **112**, and is in the shape of a straight line with a certain width. The second connecting portion is adjacent to the second pad **111**, so that height of the second connecting portion **113** after breaking is substantially flush with the lower surface **42** of the ceramic tile **4**. The user can apply an external force to break the second connecting portion **113** along the straight line, so that the portion of the second insert **12** above the second connecting portion is separated from the second pad **111** from the position of breaking. The thickness of the second connecting portion **113** is less than the thickness of the second insert, such that a second linear groove **114** is formed on the second insert **112** and inwardly recessed from the second insert **112**. The second linear groove **114** may be located on at least one of the sides, facing the ceramic tile **4**, of the second insert **112**, for example, the second linear groove **114** is only located on one of the sides, facing the ceramic tile **4**, of the second insert **112**, and the other side, facing the ceramic tile **4**, of the second insert **112** is flat; or the second linear groove is located on both sides, facing the ceramic tile **4**, of the second insert **112** (see FIG. **16**). The bottom of the second linear groove **114** is the second connecting portion **113**. With the groove structure provided on one or both sides of the second connecting portion **113**, the second connecting portion **113** is relatively thin and has a thickness of generally about 1-2 mm. Such groove structure makes the second connecting portion **113** easy to tear. After the adhesive is cured, the user can violently break or tear the upper portion of the second insert **112** from the second connecting portion **113** with a conventional plier tool.

As shown in FIG. **13**, the lower edge **1171**, facing the second pad **111**, of the limiting portion **117** of the second insert **112** is approximately parallel to the second pad **111**, and the user can remove the upper portion of the second insert **112** from the second connecting portion **113**, at the lower edge **1171** of the limiting portion **117**, with a pulling tool such as a small claw hammer. Specifically, the barbed structure of the pulling tool is used to engage into the lower edge **1171** of the limiting portion **117** to remove the portion, above the second connecting portion **113**, of the insert based on the lever principle. Also, the pulling device **35** provided on the pushing and clamping pliers **3** may be used to violently break or tear the upper portion of the second insert **112** from the second connecting portion **113**.

Referring to FIGS. **17** and **18**, the longitudinal cross-section of the second insertion block **102** is wedge-shaped, and the second insertion block **102** has a third end **1021** and a fourth end **1022**. The height of the third end **1021** relative to the bottom face **121** of the second insertion block **102** is higher than the height of the fourth end **1022** relative to the bottom face **121** of the second insertion block **102**. The second insertion block **102** comprises at least one second serration portion **120**, with the longitudinal cross-section of the second serration portion **120** also being wedge-shaped. The longitudinal cross-section refers to the cross section perpendicular to the first middle line **1112** of the second pad **111** when the second insertion block **102** is inserted into the second insert **112**. The bottom face **121**, in contact with the ceramic tile **4**, of the second insertion block **102** is a flat surface. One second serration portion **120** comprises a serration portion top face **122**, and at least two serrations **123** provided on the serration portion top face **122**. The serration portion top face **122** is an inclined face relative to the bottom face **121** of the second insertion block **102**, and the included angle $\alpha 1$ between the serration portion top face **122** and the bottom face **121** of the second insertion block **102** is an acute angle such that the serration portion top face **122** and the bottom face **121** of the second insertion block **102** extend to form an acute-angled end portion **125**, and the other end of the serration portion top face **122** extends away from the bottom face **121** of the second insertion block **102**, such that the second serration portion **120** is wedge-shaped as a whole. At least two serrations **123** are provided o the serration portion top face **122**, the multiple serrations **123** are arranged in a straight line along the serration portion top face **122**, and a serration slot **124** is formed between the adjacent serrations **123**.

The higher third end **1021** of the second insertion block **102** is provided with a base **126**, and the second serration portion **120** is disposed on the first side **1261**, facing the second insert **112**, of the base **126**. The second side **1262** of the base **126** opposite the first side **1261** thereof is provided with a second protrusion **1263**. The second protrusion **1263** is curved, i.e. the projection of the second protrusion **1263** on the bottom face **121** is an arc. The second protrusion **1263** is located in the middle of the second side **1262** of the base **126** and protrudes outward away from the base **126**, and the second protrusion **1263** can cooperate with the first groove **314** of the pushing and clamping pliers **3**.

Preferably, as shown in FIG. **18**, the bottom of the second insertion block **102** can be arranged as a sunken structure, except that the bottom face **121** used for contact with the upper surface **42** of the ceramic tile **4** is a plat surface, the second serration portion **120**, the base **126** and the second protrusion **1263** are all sunken inward from the bottom face **121** to form a sunken structure.

As shown in FIGS. **20** and **21**, when in use, the second ceramic tile leveling bracket **101** is fitted into the gap between the two adjacent ceramic tiles **4**, the end portion **125** of the second serration portion **120** of the second insertion block **102** is inserted into the insertion block

receiving portion **1120** of the second insert **112**, and the user can push the second insertion block **102** as far as possible into the insertion block receiving portion **1120** by means of the pushing and clamping pliers **3**, such that the upper edge of the insertion block receiving portion **1120** can be engaged into the serration slot **124** so as to lock the positions of the two ceramic tiles **4**. Since the bottom face **121** of the second insertion block **102** is a flat surface, the upper surfaces of the two ceramic tiles **4** are necessarily in the same plane, such that the leveling process of the two ceramic tiles **4** can be completed.

In some implementations, as shown in FIG. **17**, the second insertion block **102** comprises three second serration portions **120**, and the three serration portions **120** are disposed side by side at intervals, and the end portions **125** of the three second serration portions **120** together form the fourth end **1022** of the second insertion block **102**. When the second insert **112** is inserted into the second insertion block **102**, the second serration portions **120** on the two sides respectively cooperate with the second insertion block receiving portions **118** on the two sides of the second insert **112**; and the second serration portion **120** in the middle cooperates with the first insertion block receiving portion **116**. The limiting portion **117** of the second insert **112** can limit the second insertion block **102** to sway from side to side during the movement so as to lock the positions of the two ceramic tiles **4**.

In some implementations, the second insertion block **102** comprises two second serration portions **120**, and the two serration portions **120** are arranged side by side at an interval and are respectively located on two ends of the first side **1261** of the base **126**. When the second insertion block **102** is inserted into the second insert **112**, the two second serration portions **120** respectively cooperate with the second insertion block receiving portions **118** on the two sides of the second insert **112**. The limiting portion **117** of the second insert **112** can limit the second insertion block **102** to sway from side to side during the movement so as to lock the positions of the two ceramic tiles **4**.

In some implementations, the second insertion block **102** comprises one second serration portion **120**, and the second serration portion **120** is located in the middle of the base **126**. When the second insertion block **102** is inserted into the second insert **112**, the second serration portion **120** in the middle of the base **126** cooperates with the first insertion block receiving portion **116** so as to lock the positions of the two ceramic tiles **4**.

In addition, the insertion block **2** in Embodiment 1 is also applicable to the second ceramic tile leveling bracket **101** in this embodiment.

The pushing and clamping pliers in this embodiment may be the same as the structure of the pushing and clamping pliers in Embodiment 1, which will not be repeated herein.

Embodiment 3

FIGS. **22-26** illustrate Embodiment 3 in the present application, which discloses a ceramic tile leveling system, comprising a third ceramic tile leveling bracket **201**. This embodiment is different from Embodiment 2 in that a first rib **219** is provided on the upper surface **2111**, facing the ceramic tile **4**, of the third pad **211** of the third ceramic tile leveling bracket **201**, and the first rib **219** is disposed at the upper surface of the third pad **211** and located on one side of the third insert **212**, and is formed by the upper surface **2111** of the third pad **211** protruding away from the third pad **211**. Other features of the third ceramic tile leveling bracket **201** are the same as those of the second ceramic tile leveling bracket **101** in Embodiment 2. The pushing and clamping pliers **3** used in the embodiment 2 can also be applied to the third ceramic tile leveling bracket **201** in the present embodiment.

As shown in FIGS. **22** and **23**, the first rib **219** is an independent part separated from the third insert **212** and is not parallel to the third insert **212**, i.e. the first rib **219** can form an angle $\alpha 2$ with the projection of the third insert **212** on the upper surface **2111** of the third pad **211**. In the present embodiment, the angle $\alpha 2$ is 90 degree.

The first rib **219** is perpendicular to the third insert **212** and is located between the outer edge **2113** of the third pad **211** and the third insert **212**. Preferably, the first rib **219** is located at the second middle line **2112** of the upper surface **2111** of the third pad **211**, and the second middle line **2112** refers to a middle line, perpendicular to the third insert **212**, of the upper surface of the third pad **211**. It should be understood that, as shown, the first rib **219** can also be arranged at other positions parallel to the second middle line **2112**. The first end **2191** of the first rib **219** does not exceed the outer edge **2113** of the third pad **211**, and preferably, the first end **2191** of the first rib **219** stops at the outer edge **2113** of the third pad **211** and is flush with the outer edge **2113** of the third pad **211**. The third insert **212** has a first face **2121** facing to the first rib **219**, and a second face **2122** opposite the first face **2121**. The second end **2192** of the first rib does not exceed the second face **2122** of the third insert **212**, and preferably stops at the position where the third insert **212** is located on the third pad **211** and stops at the third insertion block through-hole **216**.

As shown in FIG. **25**, the third insertion block **202** is also provided in this embodiment in order that the bottom face of the insertion block can be kept tangent to the upper surface of the ceramic tile **4** when the insertion block is inserted into the third insert **212** without being affected by the first rib **219**. The third insertion block **212** differs from the second insertion block **102** in embodiment 2 only in that a strip groove **2022** is provided in the bottom surface **2021** of the third insertion block **202**. When the third insertion block **202** is inserted into the third insert **212**, the strip groove **2022** can receive the first rib **219**, i.e. the first rib **219** can be inserted into the strip groove **2022**, so that the bottom surface **2021** of the third insertion block **202** can keep tangent to the upper surface of the ceramic tile **4**. It should be understood that the insertion block **2** in the embodiment 1 can also be used in the present embodiment by setting a strip groove on the serration portion bottom face **21** of the insertion block **2**.

When in use, as shown in FIG. **24**, a third ceramic tile leveling bracket **201** is placed at the junction of any three adjacent ceramic tiles **4**, in which two ceramic tiles are located one side of the third insert **212** facing the first rib **219**, the two ceramic tiles are respectively located on the two sides of the first rib **219**, and the other ceramic tile is located on the side of the third insert **212** facing away from the first rib **219**. As shown in FIG. **26**, then, the third insertion block **202** is inserted into the third insert **212**. The third insertion block **202** is pushed as far as possible into the third insert **212** by means of the pushing and clamping pliers **3**, such that the third insert **212** can be engaged into the serration slots so as to lock the positions of the three ceramic tiles **4**. Since the bottom face of the third insertion block **202** is a flat surface, the upper surfaces of the three ceramic tiles **4** are necessarily located on the same plane, such that the leveling process of the three ceramic tiles **4** can be completed.

Embodiment 4

FIGS. **27-30** illustrate Embodiment 4 in the present application, which discloses a ceramic tile leveling system,

comprising fourth ceramic tile leveling bracket **301**, and which is different from Embodiment 3 in that the upper surface **3111** of the fourth pad **311** of the fourth ceramic tile leveling bracket **301** is provided with a second rib **319**, and the second rib **319** is perpendicular to the fourth insert **312**, and the second rib **319** is arranged on the two sides of the fourth insert **312**. The other technical features of the fourth ceramic tile leveling bracket **301** are the same as those of the third ceramic tile leveling bracket **201** in Embodiment 3. Preferably, the second rib **319** is located at the third middle line **3112** of the upper surface **3111** of the fourth pad **311**, and the third middle line **3112** refers to a middle line, perpendicular to the fourth insert **312**, of the upper surface **3111** of the fourth pad **311**. The first end **3191** of the second rib **319** does not exceed the first outer edge **3113** of the fourth pad **311**, and preferably stops at the first outer edge **3113** and is flush with the first outer edge **3113**; and the second end **3192** of the second rib **319** does not exceed the second outer edge **3114**, opposite the first outer edge **3113**, of the fourth pad **311**, and preferably stops at the second outer edge **3114** and is flush with the second outer edge **3114**.

The structure of the fourth insertion block **302** used in the present embodiment is the same as the third insertion block **202** in the embodiment 3 and will not be repeated here.

when in use, a fourth ceramic tile leveling bracket **301** is placed at the junction of four adjacent ceramic tiles **4**, in which two ceramic tiles **4** are located on one side of the fourth insert **312** facing the first outer edge **3113**, the two ceramic tiles **4** are respectively located on two sides of the second rib **319**, and the other two ceramic tiles **4** are located on one side of the fourth insert **312** facing the second outer edge **3114** and are respectively located on the two sides of the second rib **319**. Then, the fourth insertion block **302** is inserted into the fourth insert **312**. The fourth insertion block **302** is pushed as far as possible into the fourth insert **312** by means of the pushing and clamping pliers **3**, such that the fourth insert **312** can be engaged into the serration slots so as to lock the positions of the four ceramic tiles **4**. Since the bottom face of the fourth insertion block **302** is a flat surface, the upper surfaces of the four ceramic tiles **4** are necessarily located on the same plane, such that the leveling process of the four ceramic tiles **4** can be completed.

Embodiment 5

FIGS. **31-33** illustrate Embodiment 5 of the application and disclose a ceramic tile leveling and laying system, comprising the fifth ceramic tile leveling bracket **401**, which differs from that in the embodiment 3 only that the third rib **419** is no longer perpendicular to the fifth insert **412**, but is at an acute angle to the fifth insert **412**. The third rib **419** is provided on the upper surface **4111** of the fifth pad **411** facing the ceramic tile **4**. The third rib **419** is formed by the upper surface **4111** of the fifth pad **411** protruding away from the fifth pad **411**. The third rib **419** is not perpendicular to the fifth insert **412**, but is at an acute angle to the projection of the fifth insert **412** on the upper surface **4111** of the fifth pad **411**. The other features of the fifth ceramic tile leveling bracket **401** is the same as the third ceramic tile leveling bracket **201** in the embodiment 3. The pushing and clamping pliers **3** used in the embodiment 2 can also be applied to the fifth ceramic tile leveling bracket **401** in the present embodiment.

the third rib **419** is an independent part separated from the fifth insert **412** and is not parallel to the fifth insert **412**, i.e. the third rib **419** can form an angle $\alpha 3$ with the projection of the fifth insert **412** on the upper surface **4111** of the fifth pad **411**. In the present embodiment, the angle $\alpha 3$ is less than 90 degree.

The structure of the insertion block used in the present embodiment is similar with the third insertion block **202** in the embodiment 3 except that a strip groove on the bottom of the insertion block is adapted to the third rib **419**, and will not be repeated here. When in use, as shown in FIG. **33**, a fifth ceramic tile leveling bracket **401** is placed at the junction of three adjacent ceramic tiles **4**, in which the shape of the two ceramic tile **4** located at the third rib **419** are not rectangular or square, but parallelogram, and the two ceramic tiles **4** are located on the two sides of the third rib **419** respectively, and the other ceramic tile is located on the side of the fifth insert **412** away from the third rib **419**. Then, the insertion block is inserted into the fifth insert **412**. The insertion block is pushed as far as possible into the fifth insert **412** by means of the pushing and clamping pliers **3**, such that the fifth insert **412** can be engaged into the serration slots so as to lock the positions of the three ceramic tiles **4**. Since the bottom face of the insertion block is a flat surface, the upper surfaces of the three ceramic tiles **4** are necessarily located on the same plane, such that the leveling process of the three ceramic tiles **4** can be completed.

Embodiment 6

FIGS. **34-36** illustrate Embodiment 6 of the application and disclose a ceramic tile leveling and laying system, comprising the sixth ceramic tile leveling bracket **601**, which differs from that in the embodiment 4 only that only part of the fourth rib **519** is perpendicular to the sixth insert **612**, and the other part is at an acute angle to the sixth insert **612**. As shown in FIGS. **34** and **35**, the fourth rib **519** is provided on the upper surface **6111** of the sixth pad **611** facing the ceramic tile **4**. The fourth rib **519** is formed by the upper surface **6111** of the sixth pad **611** protruding away from the sixth pad **611**. The fourth rib **519** is divided into two portions, the first portion **5191** being located on one side of the sixth insert **612**, which forms an acute angle $\alpha 4$ with the projection of the sixth insert **612** on the upper surface **6111**, and the second portion **5192** is perpendicular to the sixth insert **612** to form a right angle $\alpha 5$. The other features of the sixth ceramic tile leveling bracket **601** is the same as the fourth ceramic tile leveling bracket **301** in the embodiment 4. The pushing and clamping pliers **3** used in the embodiment 2 can also be applied to the sixth ceramic tile leveling bracket **601** in the present embodiment.

The structure of the insertion block used in the present embodiment is the same as the third insertion block **202** in the embodiment 3 and will not be repeated here.

When in use, as shown, a sixth ceramic tile leveling bracket **601** is placed at the junction of four adjacent ceramic tiles **4**, in which the shape of the two ceramic tile **4** located at the two sides of the first portion **5191** of the fourth rib **519** are not rectangular or square, but parallelogram, and the two other ceramic tiles located at the two sides of the second portion **5192** of the fourth rib **519** are rectangle or square. Then, the insertion block is inserted into the sixth insert **612**. The insertion block is pushed as far as possible into the sixth insert **612** by means of the pushing and clamping pliers **3**, such that the sixth insert **612** can be engaged into the serration slots so as to lock the positions of the four ceramic tiles **4**. Since the bottom face of the insertion block is a flat surface, the upper surfaces of the four ceramic tiles **4** are necessarily located on the same plane, such that the leveling process of the four ceramic tiles **4** can be completed.

It should be understood that the second portion **5192** of the fourth rib **519** can also be arranged at an acute angle to the sixth insert **612** for using in the leveling process of four parallelogram ceramic tiles **4**.

Embodiment 7

FIGS. **37-46** illustrate Embodiment 7 in the present application. As shown in FIG. **37**, this embodiment discloses second pushing and clamping pliers **500** for the ceramic tile leveling system, the second pushing and clamping pliers comprising a third component **501**, a fourth component **502**, and a third pivot **503**. The third component **501** comprises a third clamping portion **5011** and a third handheld portion **5012**, and the fourth component **502** comprises a fourth clamping portion **5021** and a fourth handheld portion **5022**, wherein the fourth clamping portion **5021** is rotatably connected to the third clamping portion **5011** via the third pivot **503**. The third clamping portion **5011** is provided with a third clamping block **5013** at the top end away from the third handheld portion **5012**, the fourth clamping portion **5021** is provided with a fourth clamping block **5023** at the top end away from the fourth handheld portion **5022**, the third clamping block **5013** is disposed opposite the fourth clamping block **5023**, and the third clamping block **5013** and the fourth clamping block **5023** are approximately in the same plane. The third clamping portion **5011** extends and bends in a first direction X from the third handheld portion **5012**, and forms an obtuse angle with the third handheld portion **5012**, with the angle being θ**1**, 155°≤θ**1**≤160°. The fourth clamping portion **5021** extends and bends in a second direction Y from the fourth handheld portion **5022**, and forms an obtuse angle with the fourth handheld portion **5022**, with the angle being θ**2**, 155°≤θ**2**≤160°. The fourth clamping portion **5021** bends toward the same side as the third clamping portion **5011**, i.e. the first direction X and the second direction Y are located in the same side of the third handheld portion **5012** and the fourth handheld portion **5022**.

The second pushing and clamping pliers **500** can cooperate with the ceramic tile leveling bracket and the insertion block in Embodiment 1, Embodiment 2, Embodiment 3, Embodiment 4, Embodiment 5 and Embodiment 6 to apply a pushing and clamping force so as to lock the positions of the ceramic tiles **4**, thereby completing the leveling process of the ceramic tile **4**. Compared with the pushing and clamping pliers **3** in the embodiments described above, the second pushing and clamping pliers **500** is more convenient to operate: when the pushing and clamping pliers **3** in the embodiments described above are used, since the handheld portion of the pushing and clamping pliers **3** vertically faces upward, the user needs to turn his hand over to operate, thereby consuming more physical strength and being easily fatigue. However, in this embodiment, the clamping portion is bent, such that when the second pushing and clamping pliers **500** is used, the handheld portion is substantially in a horizontal position, such that the user can operate without turning the hand, which is conducive to saving physical strength.

As shown in FIG. **38**, the inner side faces opposite each other of the third clamping block **5013** and the fourth clamping block **5023** may be provided with second clamping teeth **504**. The second clamping teeth **504** is arranged on the side face, facing the fourth clamping block **5023**, of the third clamping block **5013**, that is, the second clamping teeth **504** of the third clamping block **5013** is disposed opposite the fourth clamping block **5023**. The second clamping teeth **504** may also be disposed on the side face, facing the third clamping block **5013**, of the fourth clamping block **5023**, that is, the second clamping teeth **504** of the fourth clamping block **5023** is disposed opposite the third clamping block **5013**. In other words, the second clamping teeth **504** of the third clamping block **5013** are disposed opposite the second clamping teeth **504** of the fourth clamping block **5023**, the inner side faces opposite each other of the two clamping blocks are clamping faces opposite each other, and the second clamping teeth **504** can increase the coefficient of friction between the clamping faces and the surface of the clamped object, thereby preventing the clamped object from slipping out.

As shown in FIG. **38**, the inner side wall of the clamping face of the third clamping block **5013** is provided with an inwardly recessed second third groove **5014**, with the direction of opening thereof facing the fourth clamping portion **5021**; and the fourth clamping block **5023** is provided with a fourth groove **5024** that penetrates the fourth clamping block **5023** toward the third clamping block **5013**, and the fourth groove **5024** and the third groove **5014** are disposed opposite each other and in the same straight line. Portions, on the two sides and at the bottom of the clamping through-groove, of the fourth clamping block **5023** form a bifurcated structure comprising two bifurcated portions, the fourth groove **5024** is located between the two bifurcated portions, and the second clamping teeth **504** of the fourth clamping portion **5021** are provided on the clamping faces on the inner sides of the two bifurcated portions. The fourth groove **5024** and the third groove **5014** are configured to match with the insertion block such that the insertion block is pushed and clamped into the ceramic tile leveling bracket so as to achieve leveling of the ceramic tiles **4**, wherein the insertion block and the ceramic tile leveling bracket may be the insertion block and the ceramic tile leveling bracket in any one of Embodiments 1-6. Here, the second insertion block **102** and the second ceramic tile leveling bracket **101** in Embodiment 2 are described as an example. As shown in FIG. **44**, when in use, the third groove **5014** cooperates with the second protrusion **1263** of the second insertion block **102**, and is located on one side of the second insert **112** of the second ceramic tile leveling bracket **101**; and the fourth groove **5024** is located on the other opposite side of the second insert **112**, and the end portion **125** of the serration portion **120** is enabled to slide in the fourth groove **5024** such that the second insertion block **102** is secured in the insertion block receiving portion **1120** so as to lock the positions of the ceramic tiles **4**.

As shown in FIGS. **37** and **39**, the second pushing and clamping pliers **500** further comprises a second elastic member **505**, with one end thereof being connected to the third clamping portion **5011**, and the other end thereof being connected to the fourth clamping portion **5021**; or with one end thereof being connected to the third handheld portion **5012**, and the other end thereof being connected to the third handheld portion **5012**. When the third component **501** and the fourth component **502** of the second pushing and clamping pliers **500** are to be relatively closed, the user only needs to use one hand to apply force to the inner side, but when they are to be relatively opened, the user needs to use two hands at the same time, so the operation is inconvenient. With the second elastic member **505** mounted between the third component **501** and the fourth component **502**, and a certain outward tension can be provided between the third component **501** and the fourth component **502**, which causes the third component **501** and the fourth component **502** to move in the opening direction, such that the user can perform opening and closing operations with one hand. The

second pushing and clamping pliers **500** further comprises a third guiding post **5051** and a fourth guiding post **5052** respectively disposed at two opposite side faces of the two handheld portions. The third guiding post **5051** protrudes from the inner side face of the third handheld portion **5012**; and the fourth guiding post **5052** protrudes from the inner side face of the fourth handheld portion **5022**, and the fourth guiding post **5052** is disposed opposite the third guiding post **5051**. The second elastic member **505** is a coil spring, with one end thereof being sheathed over the third guiding post **5051**, and the other end thereof being sheathed over the fourth guiding post **5052**. In other variant embodiments, the two guiding posts may be respectively disposed on two opposite side faces of the two clamping portions. The third guiding post **5051** protrudes from the inner side face of the third clamping portion **5011**, the fourth guiding post **5052** protrudes from the inner side face of the fourth clamping portion **5021**, and the third guiding post **5051** is disposed opposite the fourth guiding post **5052**.

As shown in FIG. **37**, the second pushing and clamping pliers **500** further comprise a second locking device **506** used to switch the second pushing and clamping pliers **500** between opened and closed states including a closed state and an opened state. When the second locking device **506** is locked, the elastic force of the second elastic member **505** is overcome so that the second pushing and clamping pliers **500** are in the closed state. When the second locking device **506** is unlocked, the second pushing and clamping pliers **500** are in the opened state under the action of the elastic force of the second elastic member **505**.

As shown in FIG. **39**, the second pushing and clamping pliers **500** further comprise a third bent portion **5015** and a fourth bent portion **5025**, which are both sheathed outside the third pivot **503**, such that the fourth component **502** is hinged to the third component **501** via the third pivot **503**. The third bent portion **5015** is part of the third clamping portion **5011**, and the fourth bent portion **5025** is part of the fourth clamping portion **5021**. The second locking device **506** comprises a second locking slot **5061**, a second locking member **5062**, and a second blocking block **507** (see FIG. **43**). The second locking member **5062** is disposed at the ends of the two clamping portions and close to the handheld portion. The second locking slot **5061** is disposed one of the third clamping portion **5011** and the fourth clamping portion **5021**, and the second locking slot **5061** is located on the outer side wall of the bent portion of the clamping portion where the second locking slot is located. The second locking member **5062** is rotatably connected to the other of the third clamping portion **5011** and the fourth clamping portion **5021** and is disposed opposite the second locking slot **5061**. The second blocking block **507** is disposed on the same clamping portion as the second locking slot **5061**, and is disposed opposite the bent portion of the other clamping portion. Here, description is made in detail taking an example in which the second locking slot **5061** is disposed on the third bent portion **5015** of the third clamping portion **5011**, the second locking member **5062** is connected to the fourth clamping portion **5021**, and the second blocking block **507** is disposed on the third clamping portion **5011**.

As shown in FIG. **39**, the second locking slot **5061** is disposed at the outer side wall of the third bent portion **5015**, the second locking member **5062** is rotatably fitted to the fourth clamping portion **5021**, preferably at the surface of the end of the fourth clamping portion **5021**, and the second locking member **5062** is disposed opposite the second locking slot **5061**. As shown in FIGS. **40**, **41** and **42**, the second locking member **5062** comprises a second locking member body **50621**, a second locking engagement block **50622**, a limiting block **50623**, and a toggle portion **50624**. The second locking member body **50621** is rotatably connected to the end of the fourth clamping portion **5021** via the fourth pivot **50625**. The second locking engagement block **50622** has an obtuse angle and is located at the surface of the second locking member body **50621**. The limiting block **50623** is formed by the surface of the second locking member body **50621** protruding outward, with the side wall thereof being bent, with one bent side wall abutting against the side wall of the end of the third clamping portion **5011**. The toggle portion **50624** is used to move the second locking member body **50621** and is disposed at the surface of the second locking member body **50621**, and the side wall of the toggle portion **50624** is inwardly recessed from the surface of the second locking member body **50621** so as to form convex corners at two ends of the side wall of the toggle portion **50624** to facilitate moving the second locking member **5062**. A toothed pattern **50626** is provided in the side wall of the toggle portion **50624** so as to increase the friction when the second locking member **5062** is moved. The toggle portion **50624** can be moved with a finger to drive the second locking member body **50621** to rotate such that the second locking engagement block **50622** is engaged into or disengaged from the second locking slot **5061**. The second locking device **506** further comprises a second blocking block **507**, which is disposed at the surface of the third clamping portion **5011** and is disposed opposite the fourth bent portion **5025**. When the second pushing and clamping pliers **500** has the maximum opening angle, the second blocking block **507** comes into contact with the fourth bent portion **5025** so as to block the fourth bent portion **5025**.

When the second pushing and clamping pliers **500** need to be adjusted from the closed state to the opened state, the two handheld portions can be first closed, and then the toggle portion **50624** is rotated counterclockwise, such that the second locking engagement block **50622** is disengaged from the second locking slot **5061** and is therefore unlocked, and the two clamping portions are opened under the action of the second elastic member **505** (coil spring). When the second pushing and clamping pliers **500** need to be adjusted from the opened state to the closed state, the two handheld portions can be first closed, and then the toggle portion **50624** is rotated clockwise, such that the second locking engagement block **50622** is engaged into the second locking slot **5061**, and the two clamping portions are therefore locked in the closed state.

It should be understood that the second locking slot **5061** may also be disposed at the outer side wall of the fourth bent portion **5025**, and the second locking member **5062** is rotatably connected to the end of the third clamping portion **5011** and is disposed opposite the second locking slot **5061**. The second blocking block **507** is disposed at the fourth clamping portion **5021**, preferably at the surface of the end of the fourth clamping portion **5021**, and is disposed opposite the third bent portion **5015**.

The pulling device **35** of the pushing and clamping pliers **3** in Embodiment 1 may also be applied to this embodiment. As shown in FIG. **45**, the second pushing and clamping pliers **500** further comprises a second pulling device **508**, which comprises a second hooked corner portion **5081** and a second rounded corner portion **5082**. The second hooked corner portion **5081** is disposed on one of the third clamping block **5013** and the fourth clamping block **5023**, and the second rounded corner portion **5082** is disposed on the other of the third clamping block **5013** and the fourth clamping block **5023**. Here, description is made taking an example in

which the second hooked corner portion **5081** is disposed at the third clamping block **5081**, and the second rounded corner portion **5082** is disposed at the fourth clamping block **5023**. The second hooked corner portion **5081** protrudes in a barbed shape from the outer side wall **50131** of the third clamping block **5013**, and the outer edge of the second hooked corner portion **5081** is a smooth flat surface or an arc-shaped curved surface, and is disposed at the junction of the side wall **50131** and the top **50132** of the third clamping block **5013**. The second rounded corner portion **5082** is disposed at the junction of the side wall **50231** and the top **50232** of the fourth clamping block **5023**, and each of the two bifurcated portions has a second rounded corner portion **5082**. It should be understood that the second hooked corner portion **5081** is in a barbed shape and can protrude from the outer side wall **50231** of the fourth clamping block **5023**, and the two bifurcated portions protrude outwardly and extend to form a second hooked corner portion **5081**, and the second hooked corner portion **5081** has an outer edge that is a smooth flat surface or an arc-shaped curved surface, and is disposed at the junction of the side wall **50231** and the top **50232** of the fourth clamping block **5023**. The second rounded corner portion **5082** can be disposed at the junction of the side wall **50131** and the top **50132** of the third clamping block **5013**.

In the ceramic tile laying process, after the adhesive is cured, the ceramic tile leveling bracket and the ceramic tiles are all fixed by the adhesive, and the second pulling device **508** of the second pushing and clamping pliers **500** can be used to remove the upper half of the ceramic tile leveling bracket, wherein the ceramic tile leveling bracket may be the ceramic tile leveling bracket of any one of Embodiments 1-4. Here, the second ceramic tile leveling bracket **101** in Embodiment 2 is described as an example. As shown in FIG. **46**, by means of the second hooked corner portion **5081** abutting against the lower edge of the limiting portion **117** of the second ceramic tile leveling bracket **101**, and taking the second rounded corner portion **5082** as a fulcrum, the second insert **112** is broken from the second connecting portion **113** to remove the portion of the second insert **112** above the second connecting portion **113**.

Embodiment 8

As shown in FIGS. **47-50**, this embodiment discloses a third pushing and clamping pliers **600** for the ceramic tile leveling system, which is merely different from the second pushing and clamping pliers **500** in Embodiment 7 in that the locking devices are different. In this embodiment, the locking device **37** used by the pushing and clamping pliers **3** in Embodiment 1 is used instead of the second locking device **506** in Embodiment 7.

As shown in FIGS. **47** and **50**, the third pushing and clamping pliers **600** comprise a third locking device **606**. The third locking device **606** comprises a third locking slot **6061**, a third locking member **6062**, and a third blocking block **607**. The third locking slot **6061** is disposed on one of the two clamping portions and is located at the outer side wall of the bent portion of the clamping portion. The third locking member **6062** is rotatably connected to the other of the two clamping portions and is disposed opposite the third locking slot **6061**. The third blocking block **607** is disposed on the same clamping portion as the third locking slot **6061**, and is disposed opposite the bent portion of the other clamping portion.

As shown in FIGS. **48** and **49**, the third locking member **6062** comprises a third locking member body **60621**, a third locking engagement block **60622**, and a second tab **60623**. The third locking member body **60621** may be a metal sheet, and is rotatably connected to the end of one of the two clamping portions via the fifth pivot **60625**. A second gasket **60626** is provided between the third locking member **6062** and the clamping portion connected thereto, the third locking member **6062** and the clamping portion are both made of metal, and the second gasket **60626** can assist in the relative rotation of the two, thereby reducing wear between the components. The third locking engagement block **60622** protrudes from the surface of the third locking member body **60621** and is located at one end, facing the third locking slot **6061**, of the third locking member body **60621**. When the third locking engagement block **60622** is engaged into the third locking slot **6061**, the third locking device **607** is locked. When the third locking engagement block **60622** is disengaged from the third locking slot **6061**, the third locking device **607** is unlocked. The second tab **60623** protrudes form the surface of the third locking member body **60621** and is preferably perpendicular to the surface of the third locking member body **60621**, and the user can move the second tab **60623** with a finger to drive the third locking member body **60621** to rotate, such that third locking engagement block **60622** is engaged into or disengaged from the third locking slot **6061**.

The above description is only preferred embodiments of the present application, and a person of ordinary skill in the art can also make some improvements and refinements to the above technical solutions without departing from the principles of the present application, and these improvements and refinements should also be considered to be within the scope of protection of the present application.

The invention claimed is:

1. A ceramic tile leveling bracket, comprising:

a pad, with an upper surface of the pad being configured to come into contact with lower surfaces of at least two adjacent ceramic tiles to support the ceramic tiles;

an insert provided on the upper surface of the pad and configured to pass through a gap between the adjacent ceramic tiles; and

a connecting portion provided on the insert and configured to break under an action of an external force so that at least part of the insert is separated from the pad;

wherein the insert comprises:

at least one insertion block receiving portion used to receive an insertion block;

wherein the at least one insertion block receiving portion comprises a first insertion block receiving portion provided on at least one outer edge of the insert in a lengthwise direction of the insert, and a second insertion block receiving portion provided in a middle of the insert.

2. The ceramic tile leveling bracket of claim **1**, wherein a thickness of the connecting portion is less than a thickness of the insert so as to form a linear groove in the insert.

3. The ceramic tile leveling bracket of claim **1**, wherein the ceramic tile leveling bracket further comprises a rib that is provided on the upper surface of the pad and is separated from the insert, and a projection of the rib on the upper surface of the pad forms an angle with a projection of the insert on the upper surface of the pad; the rib is configured between two adjacent ceramic tiles when the ceramic tile leveling bracket is in use.

4. The ceramic tile leveling bracket of claim **3**, wherein the rib is located between an outer edge of the pad and the insert, the insert having a first surface and a second surface, the first surface referring to a surface of the insert facing the

rib, the second surface referring to a surface of the insert opposite to the first surface, a first end of the rib not exceeding the outer edge of the pad, and a second end of the rib not exceeding the second surface of the insert.

5. The ceramic tile leveling bracket of claim **3**, wherein the first end of the rib does not exceed a first outer edge of the pad, and the second end of the rib does not exceed a second outer edge, opposite to the first outer edge, of the pad.

6. The ceramic tile leveling bracket of claim **1**, wherein the insertion block is wedge-shaped and has a first end and a second end lower than the first end, and a bottom surface of the insertion block in contact with the ceramic tiles is a flat surface; the insertion block comprising a protrusion and at least one wedge-shaped portion, the wedge-shaped portion comprising:

a serration portion top face, which is an inclined surface relative to the bottom surface of the insertion block and forms an acute angle with the bottom surface of the insertion block; and

at least two serrations provided on the serration portion top face;

wherein the protrusion is located on the first end of the insertion block.

7. The ceramic tile leveling bracket of claim **6**, wherein the bottom surface, opposite to the inclined surface, of each of the at least one wedge-shaped portion is provided with a strip groove.

8. The ceramic tile leveling bracket of claim **6**, wherein the at least one wedge-shaped portion comprises three wedge-shaped portions disposed side by side at intervals.

9. A ceramic tile leveling and laying system, comprising:

a ceramic tile leveling bracket configured to be disposed at a junction of at least two adjacent ceramic tiles;

an insertion block, configured to be inserted into the ceramic tile leveling bracket; and

a pair of pushing and clamping pliers, which is used to push and clamp the insertion block into the ceramic tile leveling bracket such that a bottom face of the insertion block is parallel to upper surfaces of the at least two adjacent ceramic tiles;

wherein the ceramic tile leveling bracket comprises:

a pad, with an upper surface of the pad being configured to come into contact with lower surfaces of the at least two adjacent ceramic tiles to support the ceramic tiles;

an insert provided on the upper surface of the pad and configured to pass through a gap between the adjacent the ceramic tiles; the insert comprises at least one insertion block receiving portion used to receive the insertion block; and

a connecting portion provided on the insert and configured to break under an action of an external force so that at least part of the insert is separated from the pad; wherein the at least one insertion block receiving portion comprises a first insertion block receiving portion provided on at least one outer edge of the insert in a lengthwise direction of the insert, and a second insertion block receiving portion provided in a middle of the insert;

wherein the insertion block is wedge-shaped and has a first end and a second end lower than the first end, and a bottom surface of the insertion block in contact with the ceramic tile is a flat surface; the insertion block comprising a protrusion and at least one wedge-shaped portion, wherein the wedge-shaped portion comprising: a serration portion top face, which is an inclined surface relative to the bottom surface of the insertion block and forms an acute angle with the bottom surface of the insertion block; and at least two serrations disposed on a top face of the serration portion; and wherein the protrusion is located on the first end of the insertion block;

wherein the pushing and clamping pliers comprising:

a first component comprising a first clamping portion and a first handheld portion;

a second component comprising a second clamping portion and a second handheld portion;

a pivot via which the second clamping portion is rotatably connected to the first clamping portion;

a first clamping block disposed at a top end, away from the first handheld portion, of the first clamping portion;

a second clamping block disposed at a top end, away from the second handheld portion, of the second clamping portion;

a first groove inwardly recessed from an inner side wall of the first clamping block, with a direction of opening of the clamping groove facing the second clamping portion; and

a second groove, which penetrates the second clamping block toward the first clamping block and is disposed opposite the first groove;

the first groove and the second groove being configured to hold the insertion block when the pushing and clamping pliers push the insertion block into the ceramic tile leveling bracket;

wherein the first clamping portion extends and bends in a first direction from the first handheld portion, the second clamping portion extends and bends in a second direction from the second handheld portion, wherein the first direction and the second direction are located on the same side of the first handheld portion and the second handheld portion.

10. The ceramic tile leveling and laying system of claim **9**, wherein the ceramic tile leveling bracket further comprises a rib that is provided on the upper surface of the pad and is separated from the insert, and a projection of the rib on the upper surface of the pad forms an angle with a projection of the insert on the upper surface of the pad; and the bottom surface of the insertion block is provided with a strip groove.

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